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STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
GEORGE D. NORDENHOLT, Director

DIVISION OF MINES
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY State Mineralogist

San Francisco] BULLETIN No. 110 [November, 1934

CALIFORNIA MINERAL PRODUCTION

AND

DIRECTORY OF MINERAL PRODUCERS

FOR 1933

By
HENRY H. SYMONS

CALIFORNIA STATE PRINTING OFFICE
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LETTER OF TRANSMITTAL

November, 1934.

To His Excellency, The Honorable Frank F. Merriam,
Governor of the State of California.

Sir: I have the honor to herewith transmit Bulletin No. 110 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total valuation, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

George D. Nordenbolt,
Director, Department of Natural Resources.

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INTRODUCTION

It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,
State Mineralogist.

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MINERAL INDUSTRY, CALIFORNIA, 1933

DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

CHAPTER ONE

The total value for the mineral output for California for the year 1933 was $206,489,058, being an increase of $7,292,565 over the total of 1932 which was $199,196,493. There were fifty-five different mineral substances exclusive of a segregation of the various stones grouped under gems; and all the fifty-eight counties of the State contributed to the list.

As revealed by the data following, the salient features of 1933 compared with the previous year were: Practically all of the most important mineral substances showed an increased value, led by gold, cement petroleum, salt, soda, potash, borates, diatomite, lime, barytes, pottery clay, dolomite, silica and silver. Those showing a decreased value were brick and hollow building tile, natural gas, mineral water, copper, lead, and quicksilver. Fluorspar, iodine, molybdenite, and zinc were again included in the list of producers and wollastonite, a new material, was added to our commercial output.

Of the fuels, petroleum showed an increase in value of $173,725, although there was a decrease in amount from 177,745,286 barrels to 172,139,362 barrels of crude oil. The prices received on the lighter gravity oils were slightly higher than in 1932. Natural gas decreased from 284,168,872 M cu. ft. worth $16,272,061 to 271,743,544 M cu. ft. worth $15,403,514.

Of the metals, the gold yield showed an increase from 569,166.99 fine ounces to 613,578.85 fine ounces and in value from $11,765,726 to $15,683,075. The gold value for 1933 was calculated at an average weighted price of $25.56 a fine ounce. Zinc shipments were resumed during the year; silver value increased from $139,176 to $140,907 although the amount showed a decrease from 493,533 fine ounces to 402,591 fine ounces. Chromite and tungsten ores also showed increased output and value; copper, lead, and quicksilver decreased in both amount and value from the previous year.

Of the structural materials cement increased from 5,657,549 barrels worth $7,967,107 to 7,284,031 barrels worth $10,331,395; magnesite also showed an increased value. Decreases were registered by brick and hollow building tile from a total value of $1,605,086 to $1,520,481; miscellaneous stone from a value of $7,183,643 to $6,871,581 and granite from $398,676 to $183,706. Marble and sandstone also showed decreased values.

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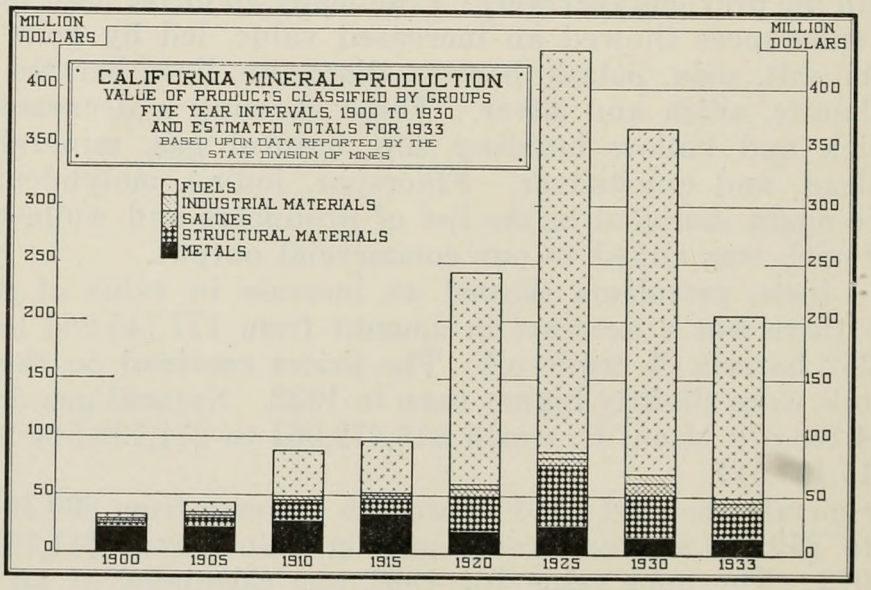
Of the industrial materials, increased values were registered by barytes, bentonite, pottery clay, dolomite, gypsum, slate, talc and soapstone, diatomite and pyrite but not enough to offset the decline in mineral water. The total value of the group decreased from $3,820,711 to $3,687,195.

Of the salines all materials of the group showed an increased value with the exception of calcium chloride. The group as a whole showed an increased total value from $6,135,440 to $8,652,224.



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By Substances.

The following table shows the comparative yield of mineral substances of California for 1932 and 1933, as compiled from the returns received at the State Division of Mines, San Francisco in answer to inquiry sent to producers:

Substance	1932		1933		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Barytes	8,507 tons	$49,409	8,405 tons	$49,595	$186+
Bentonite (fuller's earth)	4,295 tons	57,670	4,605 tons	60,621	2,951+
Borates	179,356 tons	2,856,470	197,495 tons	3,019,513	163,043+
Brick & hollow building tile		1,605,086		1,520,481	**84,605**—
Cement	5,657,549 bbls.	7,967,107	7,284,031 bbls.	10,331,395	2,364,288+
Clay (pottery)	167,284 tons	204,891	141,629 tons	211,711	6,820+
Coal	9,508 tons	36,468	2,612 tons	11,367	**25,101**—
Copper	1,417,536 lbs.	89,307	992,515 lbs.	63,521	**25,786**—
Dolomite	35,275 tons	40,956	54,456 tons	176,575	135,619+
Feldspar	2,294 tons	15,988	*	*	* —
Gems		4,961		690	**4,271**—
Gold	569,167 fine oz.	11,765,726	613,579 fine oz.	15,683,075	3,917,349+
Granite		398,676		183,706	**214,970**—
Gypsum	46,867 tons	93,818	59,235 tons	120,451	27,633+
Lead	2,418,626 lbs.	72,480	772,463 lbs.	28,583	**43,897**—
Lime	27,510 tons	254,223	33,425 tons	271,619	17,396+
Limestone	168,950 tons	487,788	207,371 tons	487,712	**76**—
Marble[a]		42,505		23,178	**19,327**—
Magnesium Salts	*	*	2,073 tons	159,660	* +
Mineral Water	19,031,224 gals.	1,495,988	15,650,406 gals.	719,746	**776,242**—
Natural Gas	284,168,827 M cu.ft.	16,272,061	271,743,544 M cu.ft.	15,403,514	**868,547**—
Petroleum	177,745,286 bbls.	142,890,247	172,139,362 bbls.	143,063,972	173,725+
Platinum	336 oz.	8,142	237 oz.	7,255	**887**—
Pumice and volcanic ash	9,891 tons	86,034	8,243 tons	61,087	**24,947**—
Quicksilver	5,349 flasks	279,780	4,102 flasks	229,472	**50,308**—
Salt	256,353 tons	918,480	321,311 tons	1,251,024	332,544+
Sandstone		13,286		10,888	**2,398**—
Silica (sand and quartz)	33,977 tons	136,324	70,329 tons	266,520	130,196+
Silver	493,535 fine oz.	139,176	402,591 fine oz.	140,907	1,731+
Slate	*	*	5,343 tons	31,958	* +
Soapstone and talc	10,690 tons	122,880	14,451 tons	153,668	30,788
Soda	58,017 tons	826,369	70,598 tons	1,019,130	192,761+
Stone, miscellaneous[b]		7,183,643		6,871,580	**312,062**—
Tungsten ore	*	*	148 tons	76,605	* +
Zinc			290,222 lbs.	12,189	12,189+
Unapportioned		[c]2,780,554		[d]4,766,089	1,985,535+
Total value		**$199,196,493**		**$206,489,058**	
Total increase					**$7,292,565**

* Included under 'Unappropriated.'

[a] Includes onyx and travertine.

[b] Includes macadam, crushed rock, ballast, rubble, rip rap, sand, gravel.

[c] Includes asbestos, bituminous rock, bromine, calcium chloride, chromite, diatomite, magnesite, magnesium salts, mica, graphite, potash, pyrite, sillimanite-andalusite-cyanite group, slate, sulphur, tungsten, tube-mill pebbles.

[d] Includes bituminous rock, bromine, calcium chloride, carbon dioxide, chromite, diatomite, feldspar, fluorspar, graphite, iodine, magnesite, mica, mineral paint, molybdenum, potash, pyrite, sillimanite-andalusite-cyanite group, sulphur, wollastonite, tube-mill pebbles.

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By Counties.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1932 and 1933:

County	*1932 Value*	*1933 Value*
Alameda	$1,765,139	$1,930,111
Alpine	1,995	12,724
Amador	1,400,286	2,028,598
Butte	464,512	404,661
Calaveras	735,199	938,981
Colusa	38,053	8,896
Contra Costa	1,013,993	1,231,971
Del Norte	25,801	3,062
El Dorado	594,902	920,747
Fresno	3,744,391	3,901,103
Glenn	8,714	11,690
Humboldt	117,475	71,051
Imperial	251,727	166,858
Inyo	724,023	1,014,713
Kern	28,069,925	27,877,930
Kings	22,720,986	25,474,252
Lake	97,084	134,851
Lassen	109,568	45,739
Los Angeles	76,721,115	68,785,294
Madera	298,021	133,105
Marin	253,837	205,150
Mariposa	379,254	575,118
Mendocino	101,669	35,283
Merced	749,742	766,014
Modoc	51,002	166,747
Mono	135,680	81,147
Monterey	166,297	114,040
Napa	169,633	209,542
Nevada	3,704,103	4,757,391
Orange	14,182,245	19,263,581
Placer	240,248	293,866
Plumas	181,312	131,150
Riverside	1,681,855	2,218,738
Sacramento	2,339,923	3,172,763
San Benito	199,924	247,479
San Bernardino	6,043,335	8,976,485
San Diego	375,176	620,881
San Francisco	3,903	7,734
San Joaquin	270,492	153,127
San Luis Obispo	249,930	55,914
San Mateo	1,343,450	1,569,480
Santa Barbara	7,583,197	7,011,773
Santa Clara	321,627	534,378
Santa Cruz	1,047,766	1,234,180
Shasta	610,986	1,113,395
Sierra	607,872	449,146
Siskiyou	184,019	374,178
Solano	36,202	16,996
Sonoma	167,849	157,988
Stanislaus	333,482	298,847
Sutter	--------	11,900
Tehama	14,387	30,334
Trinity	325,275	359,503
Tulare	116,074	178,613
Tuolumne	300,458	264,979
Ventura	14,855,606	14,558,096
Yolo	21,625	16,823
Yuba	989,149	1,150,962
Total	$199,196,493	$206,489,058

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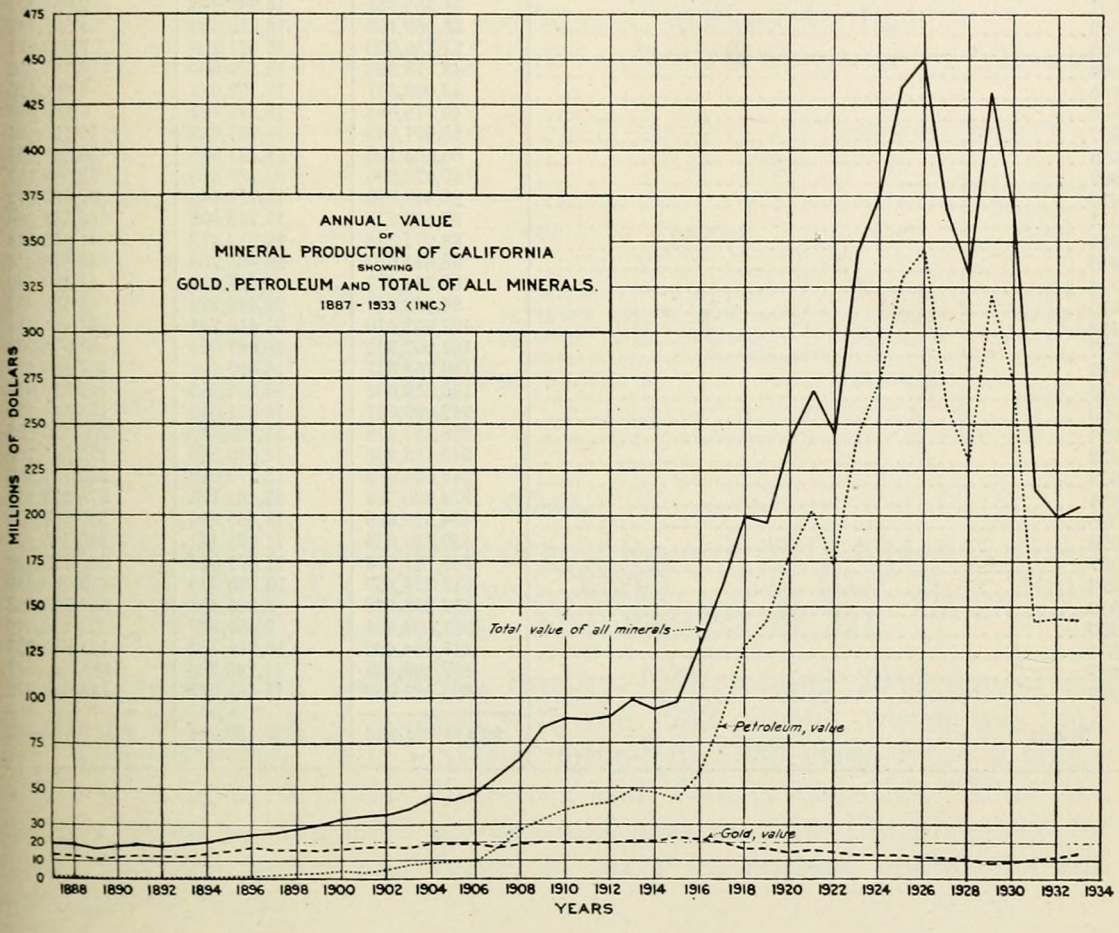
Total Mineral Production of California, by Years, Since 1887.

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and non-metal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later Plumas County. Cement increased rapidly from 1902, while crushed rock, sand and gravel as a group paralleled the cement increase. Quicksilver has been up and down. Mineral water and salt have always been



important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915–1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these have since declined, though silver, structural materials and copper increased in 1920–1924, also lead and magnesite in 1923; lead and zinc in 1925; zinc in 1926, with silver declining; an increase in quicksilver in 1927–1928, with declines in other metals and by petroleum. Natural gas has shown a steady increase since 1907, and since 1928 its value has been second only to petroleum.

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Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	$19,785,868	$13,588,614	$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,844,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,910,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,820
1906	46,776,085	18,732,452	9,238,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,870	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,024,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,835,723
1932	199,196,493	11,765,726	142,890,247
1933	206,489,058	15,683,075	143,063,972
Totals	$6,473,754,853	$732,432,714	$4,070,884,634

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CHAPTER TWO

FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which made up practically 77 per cent of the State's entire mineral output for the year 1933.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stock-food preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1932 and 1933 is shown in the following table:

Substance	1932		1933		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Coal	9,508 tons	$36,468	2,612 tons	$11,367	$25,101—
Natural gas	284,168,827 M cu.ft.	16,272,061	271,734,544 M cu.ft.	15,403,514	868,547—
Petroleum	177,745,286 bbls.	142,890,247	172,139,362 bbls.	143,063,972	173,725+
Total value		$159,198,776		$158,478,853	
Net decrease					$719,923

COAL

Bibliography: State Mineralogist Reports VII, XII–XV (inc.), XVII, XIX–XXVIII (inc.), XXVI. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, Pc. III.

Coal produced in California during 1933 totaled 2612 short tons valued at $11,367, as compared with the 1932 output, which was 9508 tons worth $36,468. The material mined in 1933 came from a single property in each, Amador, Monterey and Trinity counties. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

Total Coal Production of California.

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

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Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861	6,620	$38,065	1899	160,941	$420,109
1862	23,400	134,550	1900	176,956	535,531
1863	43,200	248,400	1901	150,724	401,772
1864	50,700	291,525	1902	88,460	248,622
1865	60,530	348,048	1903	93,026	265,383
1866	84,020	483,115	1904	79,062	376,494
1867	124,690	716,968	1905	46,500	144,500
1868	143,676	826,137	1906	24,850	61,600
1869	157,234	904,096	1907	23,734	55,849
1870	141,890	815,868	1908	18,496	55,503
1871	152,493	876,835	1909	49,389	216,913
1872	190,859	1,097,439	1910	11,033	23,484
1873	186,611	1,073,013	1911	11,047	18,297
1874	215,352	1,238,274	1912	14,484	39,092
1875	166,638	958,169	1913	25,198	85,809
1876	128,049	736,282	1914	11,859	28,806
1877	107,789	619,787	1915	10,299	26,662
1878	134,237	771,863	1916	4,037	7,030
1879	147,879	850,304	1917	3,527	7,691
1880	236,950	1,362,463	1918	6,343	16,149
1881	140,000	805,000	1919	2,983	8,203
1882	112,592	647,404	1920	2,078	5,450
1883	76,162	380,810	1921	12,467	63,578
1884	77,485	309,950	1922	27,020	135,100
1885	71,615	286,460	1923	1,010	5,090
1886	100,000	300,000	1924	1,425	8,800
1887	50,000	150,000	1925	730	3,880
1888	95,000	380,000	1926	1,100	5,000
1889	121,280	288,232	1927	200	1,100
1890	110,711	283,019	1928	782	4,542
1891	93,301	204,902	1929	450	2,476
1892	85,178	209,711	1930	10,885	59,858
1893	72,603	167,555	1931	12,551	77,607
1894	59,887	139,862	1932	9,508	36,468
1895	79,858	193,790	1933	2,612	11,367
1896	70,649	161,335			
1897	87,449	196,255	Totals	5,245,398	$23,296,776
1898	143,045	337,475			

The tonnages in the above table for the years 1861–1886 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93–94), being an average of $5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

NATURAL GAS

Bibliography: State Mineralogist Reports VII, X, XII, XIII, XIV. XXIX. Bulletins 3, 16, 19, 69, 73, 89. Monthly Summary Oil and Gas Supervisor, Dec., 1919; Aug., 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not overestimated, particularly in the six oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of

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small amounts of gas and transporting it for any considerable distance may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

Actual Production of Natural Gas—How Disposed of in California—1933

County	*M cu. ft. produced*	*M cu. ft. utilized*	*M. cu. ft. wasted*	*M cu. ft. stored*
Fresno	18,807,454	18,807,454	------	------
Kern	24,952,023	20,571,398	465,570	3,915,055
Kings	107,777,521	104,893,813	2,883,708	------
Los Angeles	73,478,865	70,490,726	1,597,703	1,390,436
Orange	18,889,921	13,669,899	5,011,674	208,348
Santa Barbara	4,337,847	3,471,759	632,022	234,066
Ventura	41,589,136	39,539,382	1,592,882	456,872
Other counties	299,113	299,113	------	------
Totals	290,131,880	271,743,544	12,183,559	6,204,777

Production and Value.

There is rather a wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1933 gave from 2¢ to 43¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1933 works out at approximately 5.7¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr, are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

Utilized Production of Natural Gas in California, 1933

Fresno	18,807,454	$1,191,237
Kern	20,571,398	916,090
Kings	104,893,813	5,216,344
Los Angeles	70,490,726	4,957,918
Orange	13,669,899	912,317
Santa Barbara	3,471,759	184,609
Ventura	39,539,382	1,957,634
Butte, Humboldt, Lake, Mendocino, Monterey, Sacramento, San Joaquin, San Mateo, Sutter and Tehama*	299,113	67,365
Totals	271,743,544	$15,403,514

* Combined to conceal the output of individual operators in each.

The above totals were a decrease in both quantity and value from those of 1932 output, which was 284,168,872 M cu. ft., valued at $16,222,061. Kings County had the largest production as to both amount and value, exceeding Los Angeles County, which led the State for several years. All the counties with the exception of Kings County showed decreased yield of natural gas.

Natural Gas Production in California Since 1888.

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in

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California was from the famous courthouse well at Stockton, bored in 1854–1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

Natural Gas Production in California Since 1888

Year	M cubic feet	Value	Year	M cubic feet	Value
1888	[a]12,000	$10,000	1912	[a]12,600,000	$940,076
1889	[a]14,500	12,680	1913	14,210,836	1,053,292
1890	[a]41,250	33,000	1914	16,529,963	1,049,470
1891	[a]39,000	30,000	1915	21,992,892	1,706,480
1892	[a]75,000	55,000	1916	28,134,365	2,871,751
1893	[a]84,000	68,500	1917	44,343,020	2,964,922
1894	[a][b]85,080	75,000	1918	46,373,052	3,289,524
1895	[a][b]110,800	100,000	1919	52,173,503	4,041,217
1896	[a][b]131,100	110,157	1920	58,567,772	3,898,286
1897	[a]71,300	62,657	1921	67,043,797	4,704,678
1898	[a]111,165	74,424	1922	103,628,027	6,990,030
1899	115,110	95,000	1923	240,405,397	15,661,433
1900	40,566	34,578	1924	209,021,596	15,153,140
1901	120,800	92,034	1925	194,719,924	15,890 082
1902	120,968	99,443	1926	214,549,477	19,465,347
1903	120,134	75,237	1927	224,686,940	20,447,294
1904	144,437	91,035	1928	260,887,116	22,260,947
1905	148,345	102,479	1929	400,129,201	29,675,546
1906	168,175	109,489	1930	315,513,952	24,559,840
1907	169,991	114,759	1931	344,959,920	16,690,695
1908	842,883	474,584	1932	284,168,872	16,272,061
1909	1,148,467	616,932	1933	271,743,544	15,403,514
1910	10,579,933	1,676,367			
1911	[a]5,000,000	491,859	Totals	[3,446,778,170	$249,694,859

[a] Quantity, in part, estimated, where values only were reported.
[b] Tabulations previous to 1933 included values of CO_2, now showing under "Industrial Materials."

Gasoline from Natural Gas.

More or less gas usually accompanies the petroleum in the oil fields, and such gas carries varying amounts of gasoline. A total of 103 plants were in operation in 1933 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 497,350,701 gallons of casing-head gasoline valued at $24,284,392 was reported made from all fields in California by plants during 1933, compared with 544,698,671 gallons worth $23,630,291 from 111 plants in 1932. It was distributed as follows:

County	*No. plants*	*Gallons*	*Value*
Fresno	1	122,914	$6,994
Kern	16	36,049,400	1,450,439
Kings	7	132,247,295	8,138,643
Los Angeles	49	219,856,483	9,612,070
Orange	14	46,877,305	2,167,962
Santa Barbara	5	17,081,931	794,230
Ventura	10	45,100,773	2,112,594
Other county	1	14,600	1,460
Totals	103	497,350,701	$24,284,392

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The usual recoveries of gasoline from natural gas vary from ½ gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Reports by Knudsen[1] gives the average recovery for 1933 as 1.575 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	M cu. ft. natural gas treated	*Gallons gasoline recovered*	*Recovery gal. per M cu. ft.*
Oil absorption	344,239,570	543,077,957	1.578
Compression	1,981,224	2,116,875	1.068
Totals	346,220,794	545,194,832	1.575

PETROLEUM

Bibliography: State Mineralogist Reports IV, VII, X, XII, XIII, XXIX. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1933 amounted to a total of 172,139,362 barrels, having a value of $148,063,972 at the well. This was a decrease in quantity with an increased value as compared with the 1932 output, which was 177,745,286 barrels worth $142,890,247.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929–1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in each field[2] and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

[1] Knudsen, E. T., 'The Petroleum situation in the Pacific Coast territory (Monthly for 1933), U. S. Bureau of Mines.

[2] By courtesy of Standard Oil Co. of California.

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TABLE A

Production and Value of Crude Oil by Counties

County	1932 Barrels	1932 Value	1933 Barrels	1933 Value
Fresno	3,665,641	$2,038,096	4,516,246	$2,586,609
Kern	35,552,561	23,393,585	35,349,272	23,521,406
Kings	21,981,835	18,398,769	21,663,622	20,253,320
Los Angeles	78,361,176	67,390,611	67,299,626	60,023,645
Orange	16,981,368	12,939,802	22,046,475	18,239,046
San Bernardino	2,472	1,884	*	*
San Luis Obispo	66,744	36,790	*	*
Santa Barbara	6,658,649	6,405,420	6,395,679	5,999,786
Santa Clara	12,954	7,125	*	*
Tulare	410	226	*	*
Ventura	14,461,476	12,277,793	14,793,286	12,398,253
Colusa, San Bernardino San Luis Obispo, San Mateo, Santa Clara, Tulare *	--------	--------	75,156	41,610
Totals	177,745,286	$142,890,247	172,139,362	$142,063,972

* Combined to conceal the output of a single operator in each.

The foregoing totals show the average price of $0.831 per barrel for the year 1933, as compared with $0.807 in the year 1932, $0.753 in 1931, $1.195 in 1930, $1.094 in 1929 and $0.992 in 1928.

TABLE B

Average Price of Oil per Barrel, by Counties, 1924-1933

County	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Fresno	$1.162	$1.094	$0.815	$0.830	$0.764	$0.519	$0.568	$0.551	$0.556	$0.573
Kern	1.137	1.432	1.445	1.139	.835	.741	.838	.636	.658	.665
Kings	--------	--------	--------	--------	--------	1.674	1.515	.723	.837	.934
Los Angeles	1.239	1.429	1.645	1.115	1.051	1.189	1.297	.784	.860	.892
Orange	1.183	1.417	1.559	1.207	.935	.986	1.060	.753	.762	.827
San Luis Obispo	.992	1.087	--------	--------	--------	--------	--------	--------	.550	--------
Santa Barbara	1.036	.914	.793	.750	1.108	1.255	1.404	.954	.962	.848
Santa Clara	1.921	1.634	--------	--------	--------	--------	--------	--------	.550	--------
Ventura	1.334	1.710	1.512	1.177	1.098	1.150	1.396	.771	.849	.838
State averages	$1.200	$1.422	$1.538	$1.127	$0.992	$1.094	$1.195	$0.753	$0.807	$0.831

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

Features of 1933.

Summary of data for the year, as given by the State Oil and Gas Supervisor,[1] is indicated as follows:

"PRODUCTION

"The total production in the State for the last six months of 1933 was 88,062,085 barrels of oil and 62,425,318 barrels of water. The production of oil for the year 1933 was, therefore, 172,138, 879 barrels, a decrease of 5,606,407 barrels compared with that of 1932. * * *

"The production of oil for the second half of 1933 was 3,985,291 more than for the first half." * * *

[1] Bush, R. D., Resume of the Oil Field Operations in 1932, Summary of Operations—California Oil Fields, Vol. 18, No. 3, January, February, and March. 1932.

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These data are compiled by the field offices of the Division of Oil and Gas from the monthly production reports, giving the individual well productions, filed with the State Oil and Gas Supervisor by all producing companies. * * *

"The estimated closed-in production was decreased in 1933 from 235,000 barrels in January to 129,686 barrels in December. The decreased closed-in production represents the output of an average of 765 wells which were restored to production during the year as a result of efforts of the industry to create additional employment." * * *

"STORAGE AND PRICE CHANGES

"The total crude and refined petroleum in storage in Pacific Coast territory at the end of 1933 was 155,464,569 barrels according to the American Petroleum Institute. The decrease in storage during the year was 11,781,856 barrels, compared with a decrease of 1,589,524 barrels during 1932. The total amount of crude and refined oil shipped to eastern parts during 1933 was 19,878,000 barrels or 8,055,000 barrels more than 1932 shipments. In March, 1933, prices of all grades of oil were reduced. In the Los Angeles Basin 14 gravity oil was reduced 10 cents per barrel, and 24 gravity oil 9 cents to 24 cents per barrel. In the San Joaquin Valley fields the reductions were 6 cents for 14 gravity oil, and 13 to 16 cents for 24 gravity oil. In June, 1933, prices of most grades of oil were increased. In the Los Angeles Basin 14 gravity oil remained unchanged, but 24 gravity oil was increased 5 to 11 cents per barrel. In the San Joaquin Valley fields the increases were 3 cents for 14 gravity oil and 1 to 10 cents for 24 gravity oil. In September, 1933, prices were again increased in the Los Angeles Basin 10 cents for 14 gravity oil and 8 to 16 cents for 24 gravity oil. In the San Joaquin Valley the increases were 5 cents for 14 gravity oil and 9 to 14 cents for 24 gravity oil.

"DRILLING AND DEVELOPMENT

"During 1933, 279 wells were reported to the State Oil and Gas Supervisor as ready to drill as compared with 279 wells in 1932. The most important event in 1933 was the discovery and development of the portion of the Huntington Beach field lying under the tidelands and belonging to the State. This was discovered and developed by directional drilling of slanting holes. Operators, after some preliminary litigation with the State, concluded agreements for the payment of royalty. Deeper zones were discovered in the Montebello and Mt. Poso fields, and substantial production was developed in the Mountain View district in Kern County."

TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,[1] in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877."[2]

In 1877 Pico averaged 40–50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake

[1] Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.
[2] *Idem*, p. 301.

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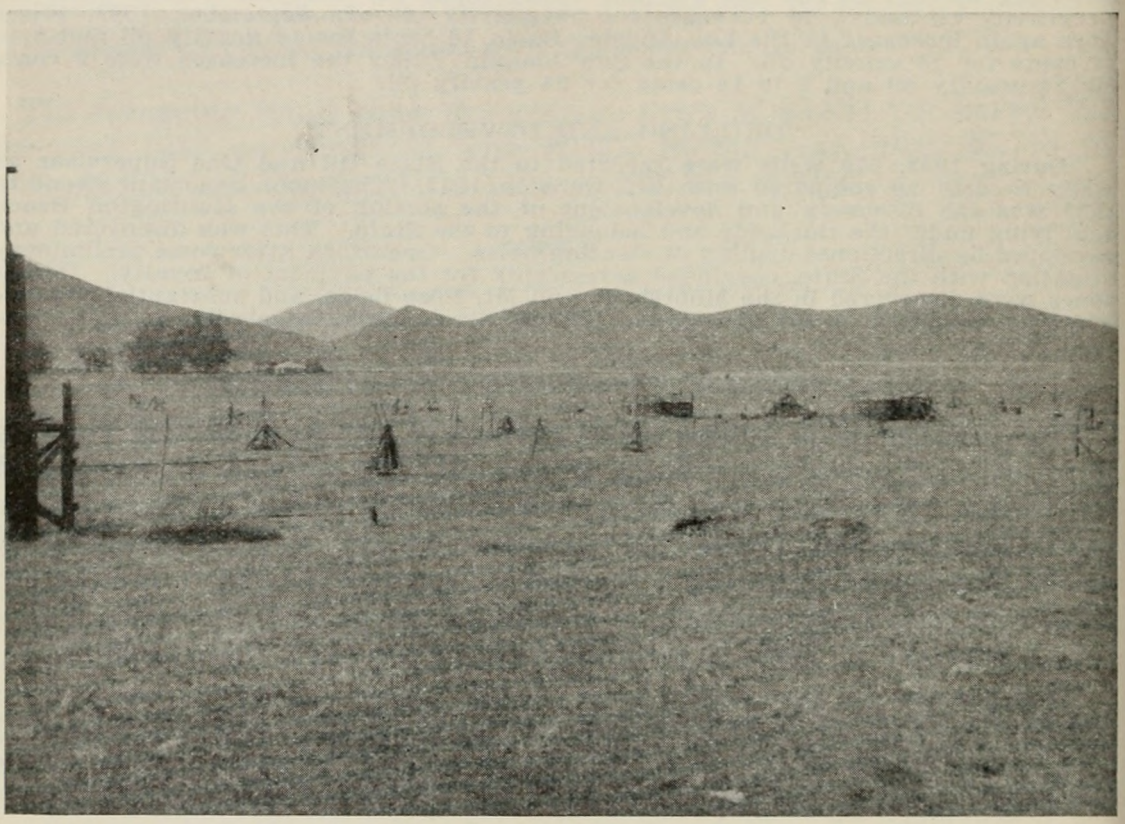
field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles



Conejo Oil Field, Ventura County. Shallow wells (100 ft. to 300 ft.) pumped by jacks and cables.

Photo by Walter W. Bradley.

County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new

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fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa Del Rey was added to the oil fields in Los Angeles County.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

TABLE C

Total Petroleum Production in California

Year	Barrels	Value	Year	Barrels	Value
To and inc. 1875	[a] 175,000	[b] $472,500	1906	32,624,000	$9,238,020
1876	12,000	30,000	1907	40 311,171	16,783,943
1877	13,000	29,250	1908	48,306,910	26,566,181
1878	15,227	30,454	1909	58,191,723	32,398,187
1879	19,858	39,716	1910	77,697,568	37,689,542
1880	40,552	60,828	1911	84,648,157	40,552,088
1881	99,862	124,828	1912	89,689,250	41,868,344
1882	128,636	257,272	1913	98,494,532	48,578,014
1883	142,857	285,714	1914	102,881,907	47,487,109
1884	262,000	655,000	1915	91,146,620	43,503,837
1885	325,000	750,750	1916	90,262,557	57,421,334
1886	[a] 377,145	[b] 870,205	1917	95,396,309	86,976,209
1887	678,572	1,357,144	1918	99,731,177	127,459,221
1888	690,333	1,380,666	1919	101,182,962	142,610,563
1889	303,220	368,048	1920	103,377,361	178,394,937
1890	307,360	384,200	1921	112,599,860	203,138,225
1891	323,600	401,264	1922	138,468,222	173,381,265
1892	385,049	561,333	1923	262,875,690	242,731,309
1893	470,179	608,092	1924	228,933,471	274,652,874
1894	783,078	1,064,521	1925	232,492,147	330,609,829
1895	1,245,339	1,000,235	1926	224,673,281	345,546,677
1896	1,257,780	1,180,793	1927	231,195,774	260,735,498
1897	1,911,569	1,918,269	1928	231,811,465	229,998,680
1898	2,249,088	2,376,420	1929	292,534,221	321,366,863
1899	2,677,875	2,660,793	1930	227,328,988	271,699,046
1900	4,319,950	4,152,928	1931	188,310,605	141,835,723
1901	7,710,315	2,961,102	1932	177,745,286	142,890,247
1902	14,356,910	4,692,189	1933	172,139,362	143,063,972
1903	24,340,839	7,313,271			
1904	29,736,003	8,317,809	Totals	4,064,684,473	$4,074,491,151
1905	34,275,701	9,007,820			

[a] U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

[b] Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

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Well Data.

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D

Wells Operated, by Fields, 1933

Field	Wells producing Dec. 1932	Wells producing Dec. 1933	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec. 1932	Bbls. per well produced per day Dec. 1933
Group No. 1—Coalinga	663	866			8	16.1	17.3
Elk Hills	195	218				61.3	50.6
Fruitvale	51	64	10	2,418	1	99.4	68.5
Kern River	913	1,104			9	9.4	7.6
Kettleman M. D.		1					545.0
Kettleman N. D.	34	48	22	101,896		1,750.8	1,101.2
Lost Hills-Belridge	159	286	4	15,299		61.4	37.9
Mountain View		6	7	6,382			505.8
McKittrick	113	167			1	14.5	13.4
Midway-Sunset	1,740	2,065	9	1,567	21	28.1	24.7
Mount Poso	90	112	16	7,395	8	83.4	74.9
Round Mountain	19	37	6	1,623	1	116.3	129.8
Wheeler Ridge	34	34				14.4	13.3
Group No. 2—Capitan		6					79.5
Elwood	35	47	5	5,307	1	381.3	264.8
Rincon	33	34	1	100		62.5	47.6
San Miguelito	2	2	1	1,540	2	514.0	450.5
Santa Barbara	8	15	7	1,139		86.3	37.7
Santa Maria	170	180			5	17.1	28.7
Summerland	64	52			1	2.5	1.4
Ventura Avenue	154	175	8	7,465	3	243.7	190.6
Ventura-Newhall	425	462	9	690	29	6.8	7.2
Watsonville	6	7				10.3	8.6
Group No. 3—Coyote	87	99	6	4,943	1	115.6	110.0
Dominguez	44	65	15	14,370	2	416.3	288.4
Fullerton (Brea-Olinda)	355	352			1	22.3	26.7
Huntington Beach	383	420	51	88,402	15	62.1	114.3
Inglewood	219	206			5	56.2	44.0
Lawndale	6	8	1	50	2	52.7	20.8
Long Beach	945	996	50	10,756	32	74.4	61.4
Los Angeles-Salt Lake	224	169			63	4.4	4.3
Montebello	154	175	1	965		31.9	29.6
Newport							
Playa Del Rey	199	175	4	401	34	67.0	54.2
Potrero	12	11			7	50.2	36.8
Richfield	156	193	4	425	3	37.5	38.9
Rosecrans	65	66			3	46.3	42.2
Santa Fe Springs	516	520	4	926	15	108.2	81.3
Seal Beach	105	113			10	104.3	94.1
Torrance	375	449	2	45	6	15.9	15.0
Whittier	140	151			1	7.6	7.3
Group No. 4—Buttonwillow Gas Field	2	1	4		1	(Gas)	(Gas)
Dudley Ridge Gas Field					2	(Gas)	(Gas)
Goleta Gas Field		1	1	(Gas)	1	(Gas)	(Gas)
Miscellaneous drilling					80		
Totals	8,911	10,158	248	274,104	378	52.9	46.8

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Specific Gravity of Oils Produced.

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Standard Oil Company. Specific gravities in California range from 8° Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Maricopa; Wheeler Ridge, Kern County.

TABLE E

Production of Light and Heavy Oils, by Fields, for 1933

Field	*Under 20° (barrels)**	*20° above (barrels)**	*Total (barrels)**
Kern River	3,201,583	--------	3,201,583
Round Mountain	995,750	124,246	1,119,996
Mount Poso	3,025,811	--------	3,025,811
Fruitvale	40,589	1,612,897	1,653,486
Mountain View	1,658	233,183	234,841
Lost Hills, Belridge	113,117	3,120,151	3,233,268
McKittrick	654,909	--------	654,909
Wheeler Ridge	--------	168,813	168,813
Midway Sunset	5,874,243	11,650,352	17,524,595
Elk Hills	1,081,710	3,404,115	4,485,825
Coalinga	2,354,255	1,950,468	4,304,723
Kettleman Hills	--------	21,577,958	21,577,958
Watsonville	23,725	--------	23,725
Arroyo Grande	65,194	--------	65,194
Lompoc	13,909	6,300	20,209
Santa Maria	175,007	983,658	1,158,665
Summerland	31,459	--------	31,459
Ventura County	46,228	1,040,674	1,086,902
Ventura Avenue	--------	12,575,405	12,575,405
Newhall	5,541	84,384	89,925
Elwood	--------	4,929,503	4,929,503
Capitan	--------	24,569	24,569
Rincon	--------	679,778	679,778
San Miguelito	--------	390,026	390,026
Santa Barbara Mesa	245,204	--------	245,204
Salt Lake	183,385	--------	183,385
Montebello	201,883	1,716,533	1,918,416
Whittier	275,495	127,112	402,607
Coyote	16,789	3,669,492	3,686,281
Fullerton	287,903	2,673,608	2,961,511
Richfield	352,044	2,112,376	2,464,420
Santa Fe Springs	--------	18,244,157	18,244,157
Huntington Beach	918,015	12,182,651	13,100,666
Torrance	1,437,828	911,817	2,349,645
Dominguez	--------	6,625,418	6,625,418
Rosecrans	--------	1,080,067	1,080,067
Inglewood	1,807,774	2,251,618	4,059,392
Seal Beach	--------	3,985,592	3,985,592
Potrero	--------	138,325	138,325
Lawndale	--------	79,092	79,092
Newport, miscellaneous	--------	677	677
Playa Del Rey	17,477	3,964,202	3,981,679
Long Beach	135,612	24,519,720	24,655,332
Los Angeles	144,733	--------	144,733
Totals	23,728,820	148,838,947	172,567,767

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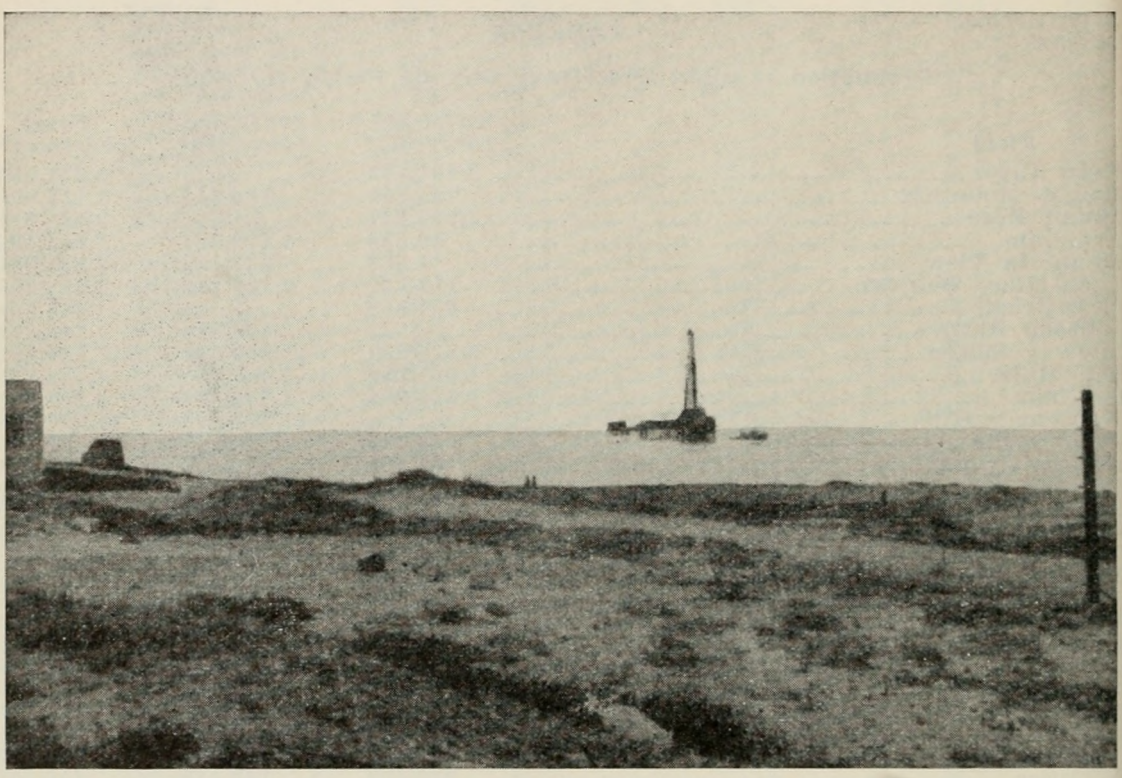
Oil in 'Storage.'

Field, refinery, pipe-line, and tank-farm stocks of crude and refined products in the Pacific Coast territory totaled 155,464,569 barrels December 31, 1933, as compared with 167,246,425 barrels on December 31, 1932. The total decrease in stock for the year was 2,238,414 barrels.

	Dec. 31, 1933, barrels	*Dec. 31, 1932, barrels*
Heavy crude and all grades of fuel, gas and Diesel oils	93,887,454	100,174,293
Refinable crude	35,920,074	39,299,041
Finished gasoline, engine distillate, and natural gasoline	13,808,061	15,670,771
Crude gasoline and naptha distillates	4,587,461	4,909,408
All other stocks	7,261,519	7,192,912
Total all stocks	155,464,569	167,246,425



Well of Rincon Oil Company, in Pacific Ocean at Rincon Field, Ventura County.

Photo by Walter W. Bradley.

Operating Data.

The following tabulation (Table F) is compiled from data published by the State Division of Oil and Gas,[1] semiannually, and here combined to show the entire year's operations for all fields. The districts are the geographical subdivisions as administered by that Division, and which are outlined on the accompanying map.

[1] Summary of Operations—California Oil Fields; Division of Oil and Gas, Fifteenth Annual Report of State Oil and Gas Supervisor, Vol. 19, No. 1, July, Aug., Sept., 1933, and No. 3, Jan., Feb., March, 1934.

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It will be noted that the State average yield of oil per-well-per-day was 57.2 barrels for the first six months of 1933 and 56.2 barrels for the second. This is somewhat higher than the figure 46.8 barrels average for December derived from American Petroleum Institute data as shown in Table D, on a previous page, due in part at least, to the fact that the latter is on a full-time basis, whereas the Division's figures allow for shut-down time.

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TABLE F. Production Statistics and Operating Data of California Oil Fields—1933

Field	January 1 to June 30						July 1 to December 31					
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced
				Oil	Water					Oil	Water	
DIST. 1—Beverly Hills	10	58,277	1,409	41.4	31.3	77.8	8	52,927	1,064	49.7	33.0	72.3
Brea-Olinda	334	1,369,225	54,634	25.1	16.1	90.4	341	1,620,962	54,141	29.9	15.4	86.3
Coyote Hills	85	1,754,758	12,785	137.3	38.3	83.1	101	1,909,334	14,009	136.3	39.7	75.4
Dominguez	59	3,220,930	9,050	355.9	81.6	84.7	65	3,452,226	10,496	328.9	71.5	87.8
Huntington Beach*	371	4,810,491	57,665	83.4	54.2	85.9	423	8,121,026	64,487	125.9	50.5	82.9
Inglewood	213	2,139,924	33,488	63.9	49.5	86.9	211	1,928,453	32,446	59.4	52.4	83.6
Lawndale*	9	45,691	1,359	33.6	28.7	83.4	8	32,084	1,191	26.9	29.1	80.9
Long Beach*	998	12,489,051	163,011	76.6	73.2	90.2	1,031	11,709,763	166,586	70.3	81.8	87.8
Los Angeles City	119	39,906	21,242	1.9	2.4	98.6	104	36,049	18,717	1.9	2.7	97.8
Montebello	165	862,934	25,797	33.5	99.2	86.4	178	1,091,273	29,307	37.2	99.1	89.5
Newhall	72	45,245	11,353	4.0	3.4	87.1	73	47,317	12,379	3.8	4.7	92.2
Playa Del Rey*	185	2,028,161	30,971	65.5	54.8	92.5	180	1,795,655	30,137	59.6	72.8	91.0
Potrero*	11	74,935	1,861	40.3	48.1	93.5	11	56,030	1,747	32.1	35.2	86.3
Richfield*	196	1,098,129	26,286	41.8	12.4	74.1	219	1,362,550	30,586	44.5	13.1	75.9
Rosecrans	65	509,634	10,005	50.9	51.8	85.0	68	545,068	11,003	49.5	59.7	87.9
Salt Lake	8	43,046	1,373	31.4	144.5	94.8	8	49,682	1,387	35.8	142.8	94.2
Santa Fe Springs*	528	9,574,343	84,866	112.8	76.4	88.8	547	8,674,684	87,174	99.5	76.8	86.6
Seal Beach	111	1,989,721	15,029	132.4	197.7	74.8	114	1,983,110	15,105	131.3	210.8	72.0
Torrance*	392	1,100,677	65,824	16.7	3.9	92.8	452	1,221,476	75,749	16.1	4.6	91.1
Whittier	159	196,001	23,949	8.2	21.2	83.2	159	205,353	28,234	7.3	16.5	96.5
San Bernardino County	1	600	35	17.1	5.0	19.3						
Totals	4,091	43,451,679	651,992	66.6	53.1	88.1	4,301	45,895,022	685,945	66.9	55.4	86.7
DIST. 2—Barsdale	75	74,393	13,211	5.6	1.3	97.3	77	74,363	13,596	5.5	1.2	96.0
Conejo	21	1,056	3,640	0.3	4.1	95.8	30	915	5,520	0.2	0.8	100.0
Ojai	47	25,555	7,764	3.3	1.2	91.3	57	28,005	9,562	2.9	2.7	91.2
Piru	81	87,331	10,798	8.1	6.7	73.7	84	87,339	11,136	7.8	9.0	72.0
Rincon	34	553,198	5,831	94.9	26.1	94.8	34	516,385	5,563	92.8	28.1	88.9
Santa Paula	32	21,353	4,673	4.6	1.9	80.7	35	20,464	4,533	4.5	5.9	70.4
Sespe	19	31,626	3,119	10.1	0.4	90.7	21	42,996	2,963	14.5	1.6	76.7
Simi	47	22,286	8,094	2.8	0.8	95.1	52	22,481	9,272	2.4	0.7	96.9
South Mountain	60	277,445	8,271	33.5	0.8	76.2	64	289,592	8,929	32.4	1.3	75.8
Ventura	162	6,303,389	26,047	242.0	31.4	88.8	176	6,313,114	27,203	232.1	26.4	84.0
Totals	578	7,397,632	91,448	80.9	12.1	87.4	630	7,395,654	98,277	75.3	10.9	84.8

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Dis 3	Arroyo Grande	18	31,726	2,822	11.2	17.1	86.6	17	29,721	2,835	10.5	10.8	90.6
	Captain	2	3,766	218	17.3	104.2	60.2	3	22,350	287	77.9	42.9	52.0
	Casmalia	7	15,115	516	29.3	124.5	40.7	10	50,067	767	65.3	81.6	41.7
	Cat Canyon	8	69,859	1,449	48.2	21.0	100.0	7	57,540	811	70.9	13.0	63.0
	Elwood	47	2,421,675	6,785	356.9	116.7	79.8	51	2,494,279	7,190	346.9	109.6	76.6
	La Goleta	----	----	----	----	----	----	[2]2	0	0	0	0	0
	Lompoc	1	2,261	27	83.7	50.7	14.9	2	20,857	101	206.5	46.4	27.4
	Mesa	9	114,295	1,495	76.5	45.6	91.8	13	114,679	2,130	53.8	82.7	89.0
	Santa Maria	120	359,246	13,503	26.6	47.4	62.2	138	615,911	17,054	36.1	41.9	67.2
	Sargent	8	4,311	1,225	3.5	0	84.6	8	4,402	1,256	3.5	0	85.3
	Summerland	32	18,241	5,453	3.3	6.3	94.1	28	15,536	4,947	3.1	6.1	96.0
	Santa Barbara County: More Ranch District	[3]1	0	0	0	0	0	----	----	----	----	----	----
	Totals	252	3,040,495	33,493	90.8	50.8	73.4	277	3,425,342	37,378	91.6	48.9	73.3
Dist. 4	Belridge	76	1,474,128	12,807	115.1	16.9	93.1	89	1,392,672	14,158	98.4	11.9	86.5
	Buttonwillow Gas	[3]2	0	0	0	0	0	[2]2	0	0	0	0	0
	Devils Den	0	0	0	0	0	0	0	0	0	0	0	0
	Elk Hills	201	2,290,302	34,221	66.9	73.9	94.1	204	2,191,320	34,282	63.9	76.2	91.3
	Elk Hills	[3]1	0	0	0	0	0	[1]1	0	0	0	0	0
	Fruitvale	58	876,624	9,417	93.1	8.7	89.7	62	810,237	9,858	82.2	7.1	86.4
	Kern River	972	1,624,839	161,508	10.1	13.3	91.8	1,064	1,620,969	176,052	9.2	16.4	89.9
	Lost Hills	79	145,779	13,251	11.0	16.0	92.7	106	195,193	15,426	12.7	14.0	79.1
	McKittrick-Temblor	125	306,937	21,636	14.2	92.4	95.6	142	329,677	22,523	14.6	96.7	86.2
	Midway-Sunset	1,806	8,547,668	298,638	28.6	26.1	91.4	1,994	9,010,204	321,314	28.0	27.5	87.6
	Midway-Sunaet	[3]7	0	0	0	0	0	[1]1	0	0	0	0	0
	Mt. Poso	105	1,478,917	14,201	104.1	79.5	74.7	114	1,572,144	15,352	102.4	86.9	73.2
	Mountain View	[4]1	49,614	49	1,012.5	0	27.1	4	170,269	445	382.6	0.6	60.5
	Round Mountain	25	493,018	3,871	127.4	156.2	85.5	32	596,010	5,176	115.1	177.7	87.9
	Wheeler Ridge	34	85,263	6,014	14.2	3.1	97.7	34	83,655	6,140	13.6	2.8	98.1
	Kern County	[5]2	2,045	48	42.6	0	13.3	[3]2	1,788	48	37.3	0	13.0
	Tulare County	[6]3	2,390	307	7.8	54.6	56.5	[9]2	1,525	160	9.5	45.5	43.4
	Totals	3,487	17,377,524	575,968	30.2	29.1	91.3	3,849	17,975,663	620,934	28.9	31.0	87.6

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TABLE F. Production Statistics and Operating Data of California Oil Fields—1933—Continued

Field	January 1 to June 30						July 1 to December 31					
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced
				Oil	Water					Oil	Water	
DIST. 5—Coalinga	639	1,966,334	109,468	18.0	14.8	94.6	718	2,549,912	116,620	21.9	15.5	88.3
Kettleman Middle Dome	1	48,915	71	688.9	6.6	39.2	1	103,063	184	560.1	8.3	100.0
Kettleman North Dome	40	10,794,215	6,363	1,696.4	44.8	87.9	50	10,717,429	7,288	1,470.6	64.3	79.2
Kings County: Dudley Ridge	[3]1	0	0	0	0	0	[7]1	0	0	0	0	0
Sutter County: Marysville Buttes	[3]1	0	0	0	0	0	[7]1	0	0	0	0	0
Totals	680	12,809,464	115,902	110.5	16.5	94.2	769	13,370,404	124,092	107.7	18.3	87.7
Grand totals	9,088	84,076,794	1,468,803	57.2	38.2	89.3	9,826	88,062,085	1,566,626	56.2	39.8	86.7
*The exact production for some wells could not be obtained and the following estimates were incorporated in the above figures:												
DIST. 1—Huntington Beach	3	23,904	575	----------	----------	----------	1	2,125	64	----------	----------	----------
Lawndale	1	1,896	105	----------	----------	----------	----------	----------	----------	----------	----------	----------
Long Beach	9	64,502	1,440	----------	----------	----------	2	8,382	222	----------	----------	----------
Playa Del Rey	7	39,233	1,031	----------	----------	----------	4	7,862	578	----------	----------	----------
Potrero	1	4,036	163	----------	----------	----------	1	937	150	----------	----------	----------
Richfield	1	510	25	----------	----------	----------	1	2,042	128	----------	----------	----------
Santa Fe Springs	1	5,576	100	----------	----------	----------	----------	----------	----------	----------	----------	----------
Torrance	3	11,468	523	----------	----------	----------	----------	----------	----------	----------	----------	----------

[1] Includes wells capable of production which were shut down on account of overproduction.
[2] Estimated.
[3] Gas wells omitted from totals.
[4] One well producing a total of 49 days.
[5] Two wells producing a total of 48 days.
[6] Three wells producing a total of 307 days.
[7] Gas wells omitted from totals.
[8] Two wells producing a total of 48 days.
[9] Two wells producing a total of 160 days.

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CHAPTER THREE

METALS

Bibliography: Reports of State Mineralogist I–XXX (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The total value of metals produced in California during 1933 was $16,256,317. Chief among these is and always has been gold; followed by quicksilver, silver, copper, lead, tungsten, and platinum.

A comparison of the 1933 output with that of the 1932 is afforded by the following table:

Substance	1932		1933		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Copper	1,417,536 lbs.	$89,307	997,511 lbs.	$63,521	$25,786—
Gold	569,167 fine oz.	11,765,726	613,579 fine oz.	15,683,075	3,917,349+
Lead	2,418,626 lbs.	72,480	772,463 lbs.	28,583	43,897—
Platinum metals	336 oz.	8,142	237 oz.	7,255	887—
Quicksilver	5,349 flasks	279,780	4,102 flasks	229,472	50,308—
Silver	493,535 fine oz.	139,176	402,591 fine oz.	140,907	1,731+
Tungsten	*	*	148 tons	76,605	* +
Zinc			209,222 tons	12,189	12,189+
Unapportioned		[a]9,509		[b]14,710	5,201+
Total value		$12,364,120		$16,256,317	
Net increase					$3,892,197

* Included under 'Unapportioned.'
[a] Includes iron, manganese, tungsten.
[b] Includes chromite and molybdenum.

ALUMINUM

Bibliography: Report XVIII, p. 198. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this State, being in Riverside County, southeast of Corona, but as yet undeveloped.

ANTIMONY

Bibliography: State Mineralogist Reports VIII, X, XII–XV (inc.), XVII, XXII, XXIII, XXV–XXVII (inc.). Bulletins 38, 91.

During 1933 there were no shipments of antimony ore in California. The principal commercial production of antimony in California has come from Kern, Inyo and San Benito counties, and other occurrences have been noted in Nevada, Riverside, San Bernardino and Santa Clara counties. The commonest occurrence is in the form of the sulphide,

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stibnite; but in the Kernville and Havilah districts in Kern County there were notable deposits of the native metal, being among the few localities of the world where native antimony has been found.

Present New York quotations (Oct. 25, 1934) are around 9.64¢ @ per pound for Chinese (duty paid) and American spot antimony.

Antimony Production in California, by Years.

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887	75	$15,500	1902		
1888	100	20,000	1915	510	$35,66(
1889			1916	1,015	64,79
1893	50	2,250	1917	158	18,78(
1894	150	6,000	1918		
1895	33	1,485	1925	*26	77(
1896	17	2,320	1926		
1897	20	3,500	1927	20	59(
1898	40	1,200	1928	20	76
1899	75	13,500	1929		
1900	70	5,700			
1901	50	8,350	Totals	2,429	$201,17

* Annual details concealed under 'Unapportioned.'

ARSENIC

Bibliography: Reports XVIII, XXIII, XXV. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite (FeAsS), which is frequently gold bearing; and in scorodite ($FeAso_4+2H_2O$), an oxidation product of arsenopyrite. The occurrence of realgar (AsS) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

BERYLLIUM

Bibliography: State Mineralogist Report XXVII. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of beryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

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Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and southwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

BISMUTH

Bibliography: Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at $2,400 in 1904, and credited to Riverside County.

Present quotations for bismuth are around $1.05 per pound, in ton lots for the refined metal.

CADMIUM

Bibliography: U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from Californian ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

Present quotations for cadmium are 55¢ per pound for the refined metal.

CHROMITE

Bibliography: State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI–XXIX (inc.). Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During the years 1932 and 1933 there were shipments of chromite in California amounting to 1206 short tons running 45% Cr_2O_3 worth $16,587. The annual details are combined under the 'Unapportioned' item to conceal the output of a single producer in 1932. The 1933 shipments were the largest in volume since 1920, and a marked increase in both amount and value over the 1932 output.

Occurrence.

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In

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1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as peridotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

Imports.

Imports of foreign chromite[1] duty free, mainly from Rhodesia, New Caledonia and India, totaled 116,511 long tons valued at $1,426,450 for the year 1933, compared with 89,143 tons worth $1,625,733 in 1932.

Total Chromite Production of California.

Production of chromite in California began, apparently, about 1874, principally in San Luis Obispo County. There was considerable activity from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons), valued at $329,924, was shipped from that county up to the beginning of 1887. Some ore also was shipped from the Tyson properties in Del Norte County. The tabulation herewith shows the output of chromite in California, annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

Total Chromite Production of California

Year	Tons	Value	Year	Tons	Value
1874–1876 (San Luis Obispo County)	26,028	$329,924	1911	935	$14,197
1887	3,000	40,000	1912	1,270	11,260
1888	1,500	20,000	1913	1,180	12,700
1889	2,000	30,000	1914	1,517	9,434
1890	3,599	53,985	1915	3,725	38,044
1891	1,372	20,580	1916	48,943	717,244
1892	1,500	22,500	1917	52,379	1,130,298
1893	3,319	49,785	1918	73,955	3,649,497
1894	3,680	39,980	1919	*4,314	97,164
1895	1,740	16,795	1920	1,770	43,031
1896	786	7,775	1921	347	6,870
1897			1922	379	6,334
1898			1923	84	1,658
1899			1924	350	6,700
1900	140	1,400	1925	191	3,712
1901	130	1,950	1926	393	7,063
1902	315	4,725	1927	225	5,063
1903	150	2,250	1928	729	15,179
1904	123	1,845	1929	327	5,025
1905	40	600	1930	84	1,905
1906	317	2,859	1931	441	6,737
1907	302	6,040	1932 [a]	1,206	16,587
1908	350	6,195	1933 [a]		
1909	436	5,309	Totals	246,322	$6,480,456
1910	749	9,707			

* Recalculated to 45% Cr_2O_3, beginning with 1919.
[a] Annual details concealed under 'Uuapportioned.'

[1] Monthly Summary of Foreign Commerce of U. S. Bureau of Foreign and Domestic Commerce, Part 1, Dec., 1933.

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COBALT

Bibliography: Report XIV. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I. C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt is around $2.50 per pound for the refined metal—35% for cash.

COPPER

Bibliography: State Mineralogist Reports VIII–XXIX (inc.). Bulletins 23, 50, 91.

The output of copper in California during 1933 amounted to a total of 1,992,515 pounds of recoverable metal valued at $63,521. This was a decrease in both quantity and value as compared with the 1932 production which was 1,427,536 pounds worth $89,307. The average price of copper in 1933 was 6.4¢ per pound compared with 6.3¢ in 1932, 9.1¢ in 1931, 13.0¢ in 1930, 17.6¢ in 1929 and 14.4¢ in 1928.

Copper has been second to gold among the metals in California since 1896 until 1932, when it was passed in value of output by both quicksilver and silver, and 1933 also by tungsten.

The distribution of the 1933 output in California by counties was as follows:

County	*Pounds*	*Value*
Amador	13,922	$891
Butte	1,133	73
Calaveras	2,248	144
El Dorado	2,755	176
Inyo	7,940	508
Nevada	67,179	4,299
San Bernardino	7,871	504
Santa Barbara	27,998	1,792
Shasta	855,108	54,727
Alpine, Humboldt, Kern, Lassen, Los Angeles, Madera, Mariposa, Mono, Placer, Plumas, Riverside, Sacramento, Sierra and Yuba*	6,361	407
Totals	992,515	$63,521

* Combined to conceal the output of individual operators in each.

Copper Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines[1] the smelter production of primary copper from domestic sources during 1933 amounted to 499,999,143 pounds, a decrease of approximately 17 per cent compared with 1932 output. The value decreased approximately 16 per cent in 1933. The average price of copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents, was 6.4¢ per pound.

[1] U. S. Bureau of Mines, Mineral Market Report, M. M. S. 292, June 13, 1934.

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Copper Production of California, by Years.

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'[1] had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures currently recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

Copper Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1882	826,695	$144,672	1909	65,727,736	$8,478,142
1883	1,600,862	265,743	1910	53,721,032	6,680,641
1884	876,166	120,911	1911	36,838,024	4,604,753
1885	469,028	49,248	1912	34,169,997	5,638,049
1886	430,210	43,021	1913	34,471,118	5,343,023
1887	1,600,000	192,000	1914	30,491,535	4,055,375
1888	1,570,021	235,303	1915	40,968,966	7,169,567
1889	151,505	18,180	1916	55,809,019	13,729,017
1890	23,347	3,502	1917	48,534,611	13,249,948
1891	3,397,405	424,675	1918	47,793,046	11,805,883
1892	2,980,944	342,808	1919	22,162,605	4,122,246
1893	239,682	21,571	1920	12,947,299	2,382,303
1894	738,594	72,486	1921	12,088,053	1,559,358
1895	225,650	21,901	1922	22,883,987	3,090,582
1896	1,992,844	199,519	1923	28,346,860	4,166,989
1897	13,638,626	1,540,666	1924	52,089,349	6,823,704
1898	21,543,229	2,475,168	1925	46,968,499	6,669,527
1899	23,915,486	3,990,534	1926	33,521,544	4,693,014
1900	29,515,512	4,748,242	1927	27,350,316	3,582,888
1901	34,931,788	5,501,782	1928	25,162,304	3,623,360
1902	27,860,162	3,239,975	1929	33,809,258	5,941,799
1903	19,113,861	2,520,997	1930	26,534,752	3,449,522
1904	29,974,154	3,969,995	1931	12,954,842	1,178,890
1905	16,997,489	2,650,605	1932	1,417,536	89,307
1906	28,726,448	5,522,712	1933	992,515	63,521
1907	32,602,945	6,341,387			
1908	40,868,772	5,350,777	Totals	1,144,566,228	$182,199,788

GOLD

Bibliography: State Mineralogist Reports I to XXX (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of years in annual value by petroleum, and by natural gas beginning with 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, including Alaska. In fact, at present, California is producing approximately 24% of the gold mined in the entire United States.

[1] Brown, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

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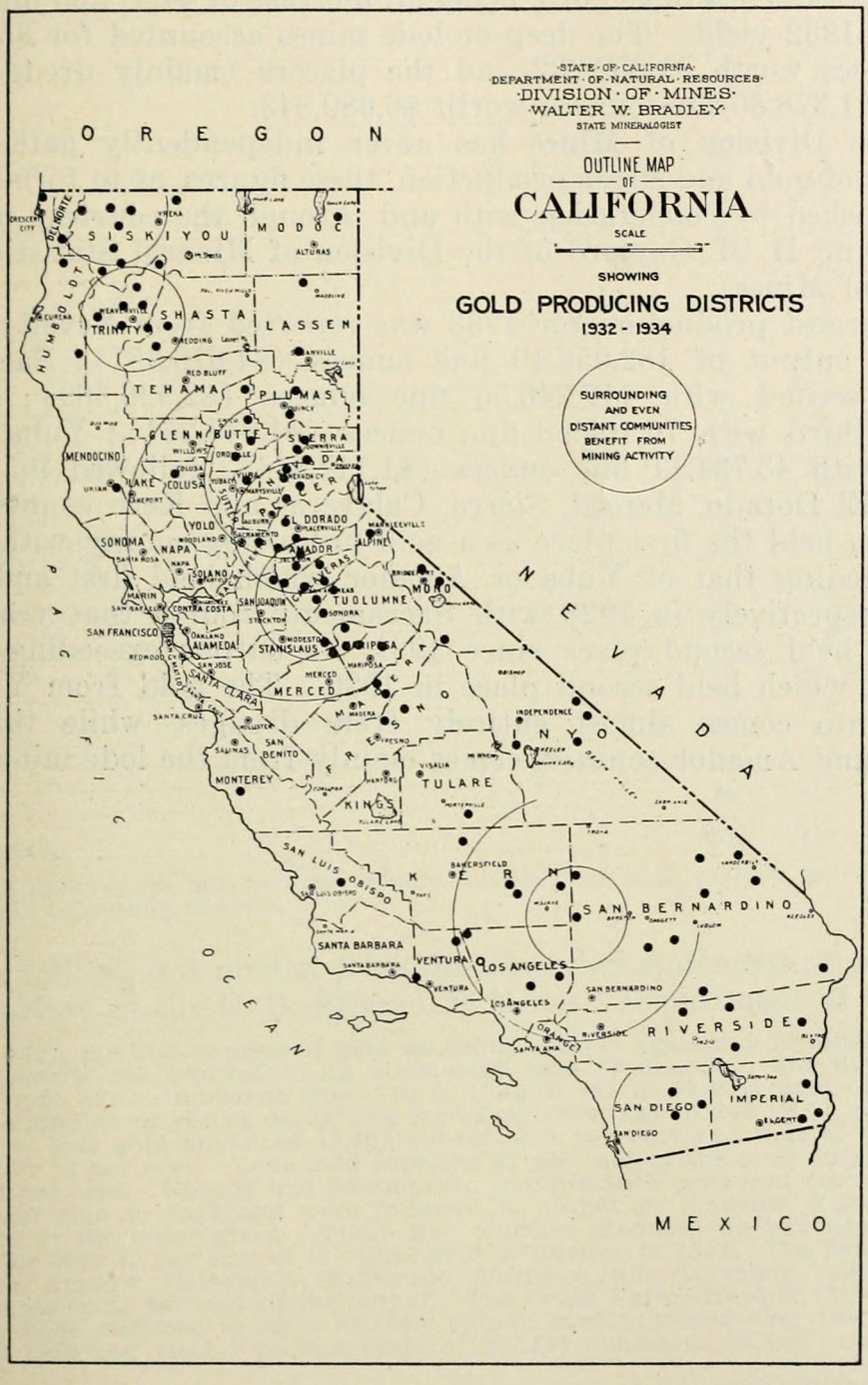
There has been a steady increase in the development of both lode and placer mines in California during the last four or five years, brought about by the present economic conditions. During 1933 there were 1790 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers. It is estimated that there were 15,000 to 18,000 of the latter class oper-



ating in the State, most of whom were people who could not find employment in other lines. There was no premium paid on gold during 1932, the price being $20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer

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which corresponds to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became $35 a fine ounce.

The production of gold in California during 1933 totaled 631,578.85 fine ounces worth $15,683,075, being an increase of 44,411.86 fine ounces over the 1932 yield. The deep or lode mines accounted for 351,199.99 fine ounces worth $9,002,232 and the placers (mainly dredges) produced 261,378.86 fine ounces worth $6,680,843.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of F. W. Horton and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.

The largest production for 1933 was reported from Nevada County with an output of 182,956.10 fine ounces ($4,676,357); Sacramento County second with 117,240.56 fine ounces ($2,996,669); Amador County third with 76,105.68 fine ounces ($1,945,261); Yuba County fourth with 43,734.11 fine ounces ($1,117,844); followed in turn by Shasta, El Dorado, Merced, Sierra, Calaveras and Kern counties.

Nevada held the first place as a gold producing county with an output exceeding that of Yuba or Amador which held first and second places respectively in 1928 with Sacramento fourth that year. Sacramento held second place since 1931, its output exceeding that of Amador, which held second place in 1930. The gold from Yuba and Sacramento comes almost entirely from dredges, while that from Nevada and Amador counties comes mainly from the lode mines.

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Distribution of the 1933 gold output by counties was as follows:

County	Number of operators[a] Placer	Lode	Value
Alpine	---	1	$1,651
Amador	74	46	1,945,261
Butte	80	16	296,159
Calaveras	88	63	442,980
Colusa	---	1	57
Del Norte	9	---	1,933
El Dorado	66	59	540,929
Fresno	20	10	19,459
Humboldt	25	---	5,902
Imperial	6	5	6,293
Inyo	6	37	62,312
Kern	28	108	424,376
Lassen	---	3	8,349
Los Angeles	23	8	15,861
Madera	6	16	8,962
Mariposa	49	66	254,663
Mendocino	1	---	155
Merced	9	---	451,023
Modoc	---	3	1,346
Mono	5	11	33,378
Monterey	1	2	195
Nevada	60	24	4,676,357
Orange	2	---	105
Placer	33	24	167,774
Plumas	45	13	70,000
Riverside	6	20	14,993
Sacramento	15	2	2,996,669
San Bernardino	20	67	116,074
San Diego	3	7	5,894
San Joaquin	3	---	1,017
San Luis Obispo	1	---	759
Santa Barbara	---	1	27
Santa Cruz	1	---	307
Shasta	26	20	618,290
Sierra	53	23	445,102
Siskiyou	75	40	324,954
Stanislaus	11	---	148,204
Trinity	65	18	345,851
Tulare	2	6	2,152
Tuolumne	39	65	107,736
Ventura	---	3	1,593
Yolo	1	---	129
Yuba	36	9	1,117,844
Totals	993	797	$15,683,075

[a] Number does not include snipers, prospectors and various individuals selling small lots to bullion dealers.

The following is quoted from the advanced statement of gold in 1933 by courtesy of the U. S. Bureau of Mines,[b] Department of Commerce:

"In 1933, the higher price of gold caused a notable expansion in mining operations in California and resulted in an augmented gold production. The number of producing lode mines increased from 718 in 1932 to 797 in 1933, a gain of 11 per cent, and the number of placer operations increased from 828 to 993 or 20 per cent. The output of lode gold advanced 13,563 ounces or 4 per cent and that of placers 30,849 ounces or 13 per cent. Lode gold supplied 57 per cent of the total output and placer gold 43 per cent. Nevada and Sacramento counties each produced more than 100,000 ounces of gold in 1933 and were followed in output by Amador, Yuba and Shasta counties in the order given. These five counties produced an aggregate of 444,226 ounces or over 72 per cent of the total gold production in 1933. The five Mother-Lode counties, Amador, Calaveras, El Dorado, Mariposa, and Tuolumne, contributed 128,778 ounces or 21 per cent of the output. The Grass Valley-Nevada City, Folsom, and Mother-Lode districts, in order of their output, each produced over 100,000 ounces of gold in 1933 and yielded an aggregate of 397,859 ounces or 65 per cent of the State total.

"In 1933, dry gold ore yielded over 99 per cent of the gold recovered from lode mines. Amalgamation accounted for 72 per cent of the total output of lode gold, smelting of concentrates 15 per cent, cyanidation 11 per cent, and smelting of ore 2 per cent. The largest producers of gold in California in 1933, in order of output, were Empire Star Mines Co., Ltd., Grass Valley-Nevada City district; Natomas Co., Folsom district; Yuba Consolidated Goldfields, Yuba and Snelling districts; Idaho-Maryland Mines Co., Grass Valley-Nevada City district; Capital Dredging Co., Folsom district; the Argonaut Mining Co., Jackson district; Mountain Copper Co., Ltd., Iron Mountain district; Kennedy Mining & Milling Co., Jackson district; Central Eureka,

[b] U. S. Bureau of Mines, advanced statement for 1933, Mineral Yearbook 1933–34, pp. 151–153.

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Sutter Creek district; and Original Sixteen to One Mine, Alleghany district. These 10 companies produced 406,788 ounces or more than two-thirds of the total output.

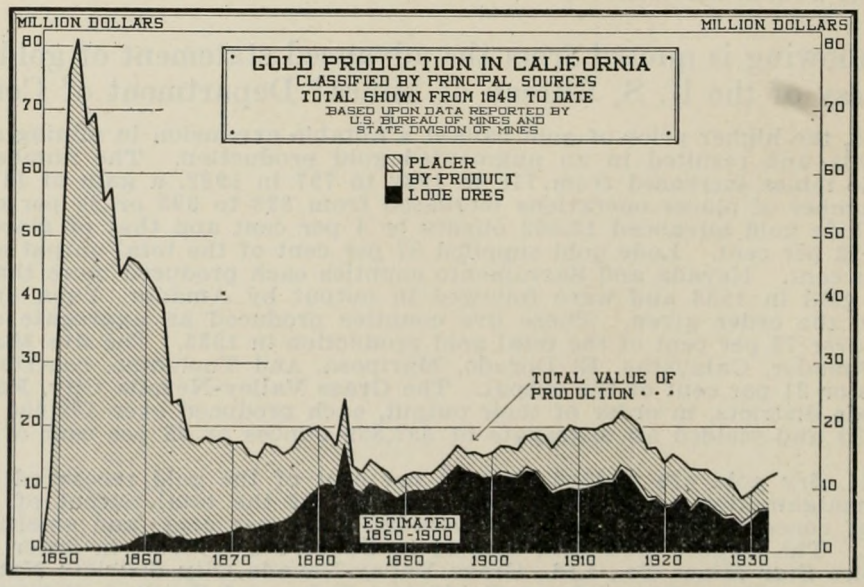
"Of the placer production 77 per cent was supplied by 16 companies working 25 dredges. These dredges recovered 201,710 ounces of gold from 55,331,000 cubic yards of gravel, an average yield of 0.0036 ounce per cubic yard as compared with a recovery of 0.0039 ounce per cubic yard to 1932."

"The following 20 mines or companies, virtually all of which were old, established producers, yielded 301,411 fine ounces of lode gold, or slightly more than half of the total gold output of the State: Empire Star Mines Co., Ltd., Idaho Maryland Mines Co., Great Northern Gold Mines, Inc. (Hoge), and Golden Center Mine, all in Nevada County; Argonaut Mining Co., Ltd., Kennedy Mining & Milling Co., Central Eureka Mining Co., and Pioneer Lucky Strike Gold Mining Co., all in Amador County; The Mountain Copper Co., Ltd., Shasta County; Original Sixteen to One Mine, Inc., Sierra County; Middle Fork Gold Mining Co. (Sliger); Montezuma-Apex Mining Co., and Beebe Gold Mining Co., El Dorado County; Yellow Aster and King Solomon, Kern County; Carson Hill and Royal, Calaveras County; King Solomon Mines Co., Siskiyou County; and Pacific Mining Co. (Pine Tree and Josephine) and Diltz, Mariposa County. On account of the appreciation in the price of gold much marginal ore was transformed into payable or reserves which in many instances were further increased by active development work.

The ladies also do their part in panning operations—a Fresno County scene.

Photo by Walter W. Bradley.

"The production of gold by dredging was 201,710 fine ounces—approximately one-third the gold output of the State and 12,869 ounces more than the dredge output in 1932. The Natomas Co. with 6 dredges and the Capital Dredging Co. with 3 dredges in the Folsom district, Sacramento County, and the Yuba Consolidated Gold Fields with 3 dredges at Hammonton, Yuba County, and 1 in Merced County were the largest operators and made a combined output of over three-fourths of the total dredge production. The 13 dredges of these companies handled 41,917,000 cubic yards of gravel, an average of 3,224,400 cubic yards apiece. Each of the following companies operated a single dredge: The Lancha Plana Gold Dredging Co. at Camanche, Amador County; Shasta Butte Gold Dredging Co., Oroville, Butte County; Allen Placer, Burson, Calaveras County;



Canyon Creek Dredging Co., Georgetown, El Dorado County; Snelling Gold Dredging Co., Snelling, Merced County; Gold Hill Dredging Co. in the Willow Hill district, 2 miles southeast of Folsom, Sacramento County; Crow Creek dredge at Cottonwood, Shasta County; Cal Oro Dredging Co. on Greenhorn Creek, Yreka, Siskiyou County; La Grange Gold Dredging Co., La Grange, Stanislaus County; Gold Bar Dredging Co. and Trinity Dredging Co., both at Lewiston, Trinity County.

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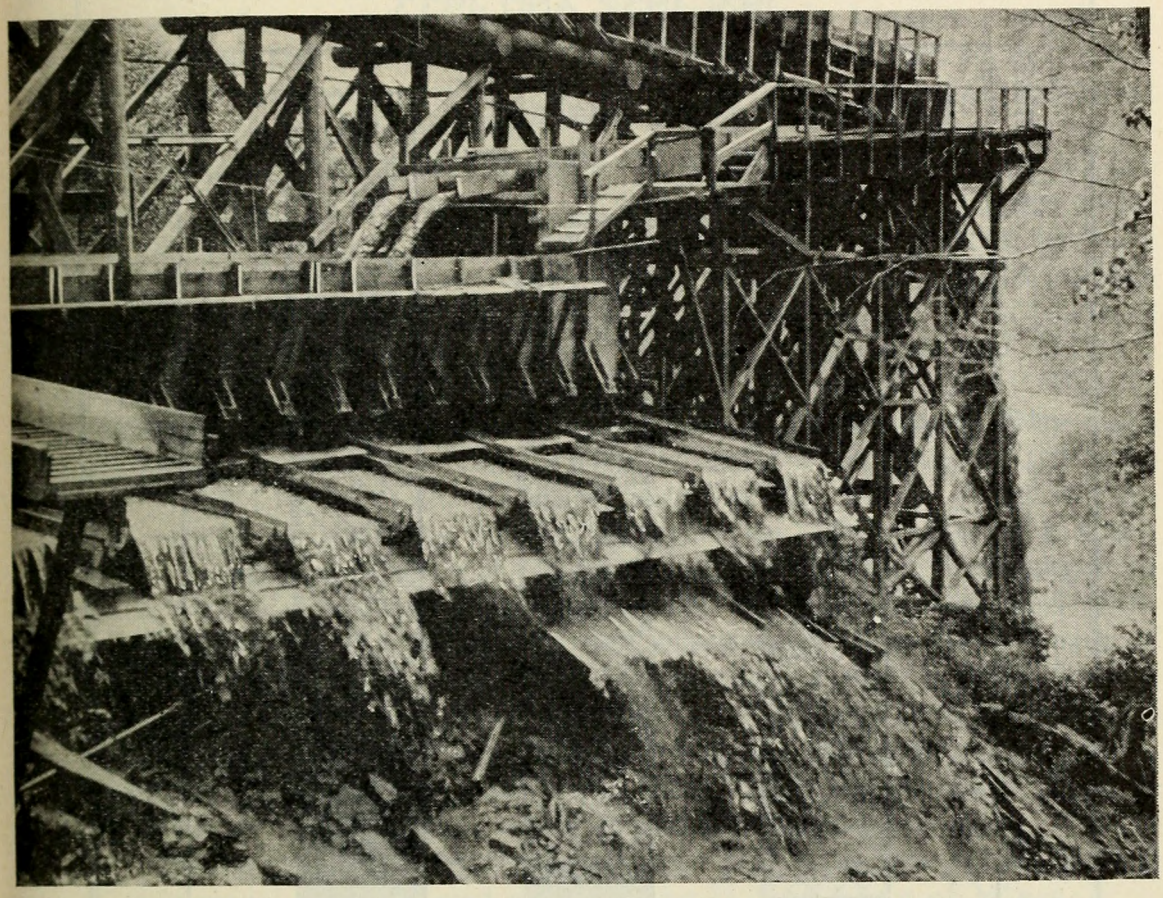
"The 14 companies named operated a total of 24 dredges which handled 55,296,890 cubic yards of gravel and made an average recovery of 0.0036 ounce of fine gold per cubic yard.

"The Natomas Co. had a most successful year. Its dredges recovered 69,425 ounces of fine gold from 18,290,841 cubic yards of ground with a gross return of $0.0981 per cubic yard. The quantity of gravel washed increased 1,999,143 yards and the gross yield $0.0185 per yard over 1932. Costs per yard were reduced about 3 per cent to $0.0459 per yard. A new dredging area estimated to contain about 52,000,000 cubic yards of profitable ground was developed in prospecting, and the company authorized the construction of a 16-cubic-foot dredge, designed to dig 40 feet below the water line, to bring this area into production.

"The Yuba Consolidated Gold Fields began construction of a new dredge west of Hammonton, which will have a large capacity and will be capable of digging to a greater depth than any of the company's other dredges. Part of the equipment of the new dredge was obtained by dismantling one that had worked out its ground on the north side of the Yuba River. This corporation reported acquisition of one new dredging property and the possibility of further extending its operations on the Yuba River. The Lancha Plana Gold Dredging Co. handled about 3,000 cubic yards of gravel a day at its properties on the Mokelumne River, 17 miles westerly from



Undercurrent at the Salyer Hydraulic Mine in Trinity County.

Cut by Courtesy of Engineering and Mining Journal.

San Andreas. Twelve men were employed. The Gold Hill Dredging Co. started mining April 1, with a dredge moved from near Dayton, Nev. The Gold Bar Dredging Co. rebuilt its dredge damaged by fire and recommenced mining in June.

"The large increase in the price of gold, if maintained, will notably extend the areas that may be mined profitably and thus add many years to the life of the gold-dredging industry in the State.

"The output of drift placers was relatively unimportant compared with the total gold output of the State. The five largest producing mines, in order of output, were the Calaveras Central at Angels Camp, Calaveras County; Gray Wing Extension at Folsom, Sacramento County; Vallecito-Western 3 miles east of Angels Camp, Calaveras County, operated by the Tonopah Belmont Development Co.; Cohen-Gooday on the West Branch of Feather River in Butte County, operated by the Genii Consolidated Mines Co., Ltd.; and the New Era at Oroville, Butte County. These five mines produced a total of 7,829 fine ounces of gold.

"The production of gold from hydraulic operations in California is surrounded by so many restrictions as to tailings disposal that it constituted less than 1 per cent of the State's total output in 1933. Trinity, Siskiyou, and Sierra counties, in the order named, were the leading producers of placer gold by hydraulicking and yielded over half the output. The Redding Creek placers 7 miles from Douglas City, Buckeye Placer Mines, Inc., Carrville, Red Hill mine on the Trinity River 3½ miles from

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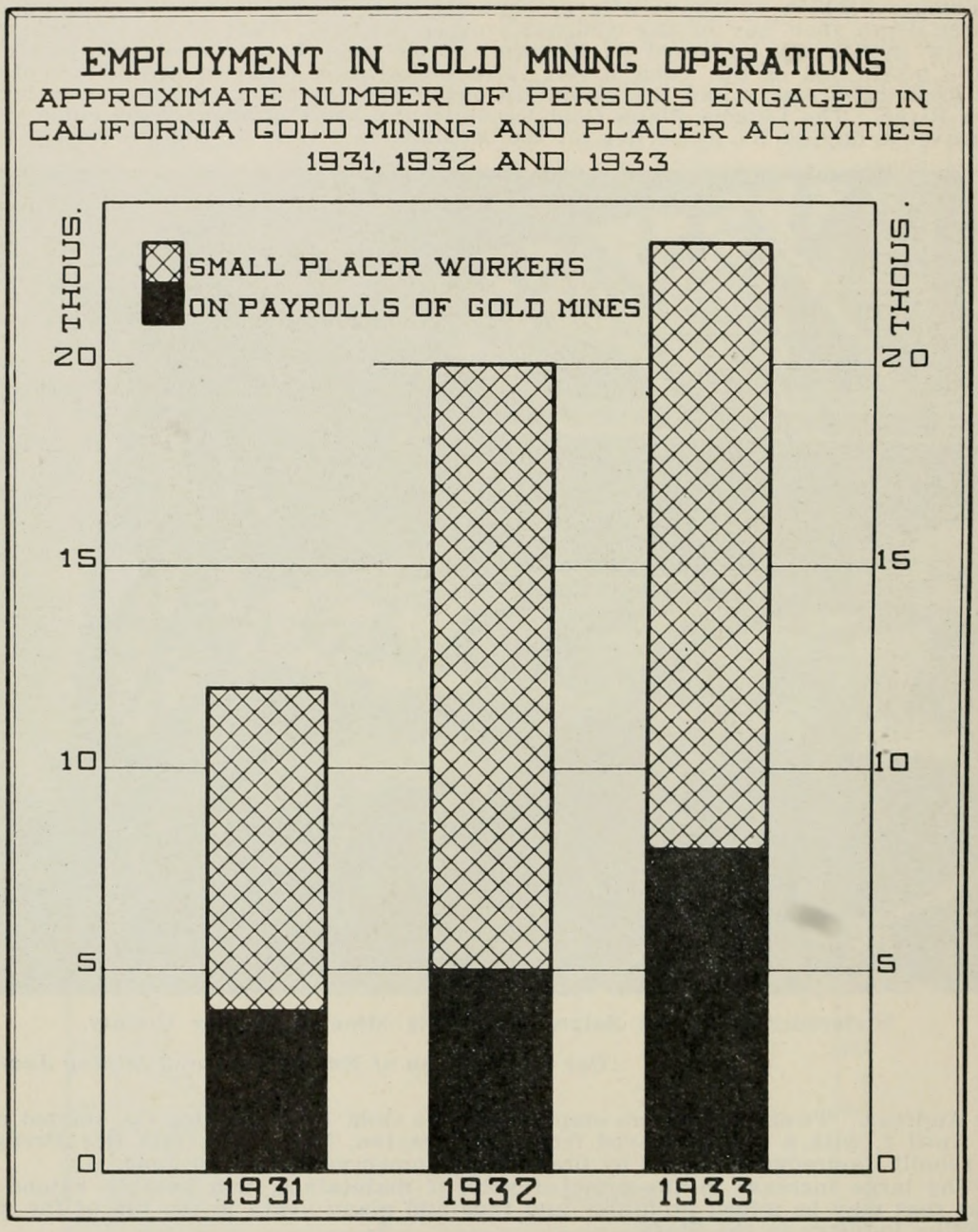
Junction City, Osborne Hill mine 1 mile southwest of Helena, all in Trinity County; and the Depot Hill mine, 5 miles northeast of Camptonville, Sierra County, were the five largest producers by hydraulicking and yielded a total of 2,037 fine ounces of gold.

"One hundred and seven bullion dealers in California, including banks, merchants, and private refiners licensed by the State Mineralogist of California under the Ore Buyers License Act, commonly known as the 'High-Grade Bill,' sold approximately 42,600 fine ounces of gold (7 per cent of the estimated total State production) to the San Francisco mint and other refiners. The major part of this gold was derived from small-scale placer operations and some from pocket hunting. Most of the placer gold purchased by licensed bullion buyers came from the Cosumnes River in Eldorado and Amador counties; the Feather River and its tributaries and Big



Butte Creek in Butte and Plumas counties; Mokelumne River in Amador and Calaveras counties; Big Canyon and Weber Creeks in Eldorado County; the Yuba River and Deer Creek in Nevada County; North, South, and Middle Forks of the American River and Buckeye, Blue Canyon, and Indian Creeks in Placer County; Black Hawk, Nelson, Rush, Sloat, Spanish, and Squirrel Creeks in Plumas County; Klamath and Salmon Rivers and their tributaries in Siskiyou County; the Sacramento River and its tributaries, Beegum, Clear, and Cottonwood Creeks, and French Gulch in Shasta County; Trinity River and its tributaries in Trinity County; and Stanislaus and Tuolumne Rivers and Bull and Woods Creeks in Tuolumne County. Some of the gold purchased was recovered from the beach sands in Santa Cruz, Monterey, and Humboldt counties, and small quantities were derived from San Gabriel and San Francisquito Canyons in Los Angeles County. Bullion buyers in Fresno, Humboldt, Kern, and San Bernardino counties reported minor purchases."

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Total Gold Production of California.

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,[1] and possibly 1820.[2] On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported[3] to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, state geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

The figures for 1903–1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

[1] Hittell, T. H., History of California, Vol. II, p. 312, 1885.
[2] Bancroft, H. H., History of California, Vol. II, p. 417, 1886.
[3] Mercantile Trust Review of the Pacific, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

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Total Gold Production of California

Year	Value	Year	Value
1848	$245,301	1892	$12,571,900
1849	10,151,360	1893	12,538,780
1850	41,273,106	1894	13,863,282
1851	75,938,232	1895	15,334,317
1852	81,294,700	1896	17,181,562
1853	67,613,487	1897	15,871,401
1854	69,433,931	1898	15,906,478
1855	55,485,395	1899	15,336,031
1856	57,509,411	1900	15,863,355
1857	43,628,172	1901	16,989,044
1858	46,591,140	1902	16,910,320
1859	45,846,599	1903	16,300,653
1860	44,095,163	1904	18,633,676
1861	41,884,995	1905	18,898,545
1862	38,854,668	1906	18,732,452
1863	23,501,736	1907	16,727,928
1864	24,071,423	1908	18,761,559
1865	17,930,858	1909	20,237,870
1866	17,123,867	1910	19,715,440
1867	18,265,452	1911	19,738,908
1868	17,555,867	1912	19,713,478
1869	18,229,044	1913	20,406,958
1870	17,458,133	1914	20,653,496
1871	17,477,885	1915	22,442,296
1872	15,482,194	1916	21,410,741
1873	15,019,210	1917	20,087,504
1874	17,264,836	1918	16,528,953
1875	16,876,009	1919	16,695,955
1876	15,610,723	1920	14,311,043
1877	16,501,268	1921	15,704,822
1878	18,839,141	1922	14,670,346
1879	19,626,654	1923	13,379,013
1880	20,030,761	1924	13,150,175
1881	19,223,155	1925	13,065,330
1882	17,146,416	1926	11,923,481
1883	24,316,873	1927	11,671,018
1884	13,600,000	1928	10,785,315
1885	12,661,044	1929	8,526,703
1886	14,716,506	1930	9,451,162
1887	13,588,614	1931	10,814,162
1888	12,750,000	1932	11,765,726
1889	11,212,913	1933	[a]15,683,075
1890	12,309,793		
1891	12,728,869	Total value	$1,879,919,157

[a] Value calculated at an average weighted price of $25.56 a fine ounce; previously $20.6718.

IRIDIUM (see under Platinum)

IRON ORE

Bibliography: State Mineralogist Reports II, IV, V, X, XII–XV (inc.), XVII, XVIII, XXI–XXVII (inc.). Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117–122; Vol. 123, pp. 94–96, 113–114.

During 1933 there were several shipments of iron ore in San Bernardino County to the cement mills to be used in the manufacture of high-iron cement. To avoid duplication, the value of these shipments is not given here, as it is included in the value of the cement thus made. There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

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Total Iron Ore Production of California.

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881*	9,273	$79,452	1915	724	$2,584
1882	2,073	17,766	1916	3,000	6,000
1883	11,191	106,540	1917	2,874	11,496
1884	4,532	40,983	1918	3,108	15,947
1885			1919	2,300	13,796
1886	3,676	19,250	1920	5,975	40,889
1887			1921	1,970	12,030
1893	250	2,000	1922	3,588	18,868
1894	200	1,500	1923	3,102	18,665
1895			1924 / 1925 [a]	785	4,710
1907	400	400			
1908			1926 / 1927 [a]	5,272	26,000
1909	108	174			
1910	579	900	1928		
1911	558	558	1930 / 1931 [a]	100	700
1912	2,508	2,508			
1913	2,343	4,485	1932		
1914	1,436	5,128			
			Totals	71,905	$553,329

* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotaling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

[a] Annual details concealed under 'Unapportioned.'

LEAD

Bibliography: State Mineralogist Reports IV, VIII–XV (inc.), XVII–XXVIII (inc.).

The production of lead in California during 1933 was 772,463 pounds of recoverable metal valued at $28,583, as compared with the 1932 figures, which were 2,418,626 pounds worth $72,480. The average value of lead in 1933 was 3.7¢ per pound, compared with 3.0¢ per pound in 1932, 3.7¢ per pound in 1931, 5.0¢ per pound in 1930, and 6.3¢ per pound in 1929.

Distribution of the 1933 output by counties was as follows:

County	*Pounds*	*Value*
Alpine	1,169	$43
Amador	31,845	1,178
Calaveras	6,363	235
Inyo	601,135	22,241
Los Angeles	2,006	74
Madera	5,442	201
Mono	4,583	170
Nevada	72,380	2,678
San Bernardino	27,936	1,034
Shasta	14,883	551
Ventura	1,631	64
Butte, El Dorado, Kern, Lassen, Placer, Plumas, Riverside, Sacramento, Siskiyou, Stanislaus, Trinity, Tuolumne, and Yuba *	3,090	114
Totals	772,463	$28,583

* Combined to conceal the output of individual operators in each.

Lead Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines[1] during 1933, the production of primary lead in the United States was 259,616 short tons, valued at $19,212,000, being an increase over the

[1] U. S. Bureau of Mines Mineral Market Report 286, May 24, 1934.

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national production of 1932 which was 255,337 short tons worth $15,320,000 due to decreased selling price of lead from an average of 3.0¢ in 1932 to 3.7¢ per pound in 1933.

Lead Production of California, by Years.

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

Total Production of Lead in California, by Years

Year	Pounds	Value	Year	Pounds	Value
1877	[a] 7,836,000	$391,800	1907	328,681	$16,690
1878	8,640,000	328,320	1908	1,124,483	46,663
1879	4,502,000	191,335	1909	2,685,477	144,897
1880	4,200,000	215,460	1910	3,016,902	134,082
1881	6,680,000	325,316	1911	1,403,839	63,173
1882	[b] 4,000,000	196,800	1912	1,370,067	61,653
1883	[c] 3,400,000	145,520	1913	3,640,951	160,202
1884	3,200,000	120,512	1914	4,697,400	183,198
1885	2,000,000	80,900	1915	4,796,299	225,426
1886	2,000,000	93,400	1916	12,392,031	855,049
1887	[d] 1,160,000	52,200	1917	21,651,352	1,862,016
1888	900,000	38,250	1918	13,464,869	956,006
1889	940,000	35,720	1919	4,139,562	219,397
1890	800,000	36,000	1920	4,903,738	392,300
1891	1,140,000	49,020	1921	1,149,051	51,707
1892	1,360,000	54,400	1922	6,511,280	358,120
1893	666,000	24,975	1923	9,934,522	695,416
1894	950,000	28,500	1924	4,984,387	398,751
1895	1,592,400	49,364	1925	7,352,422	639,661
1896	1,293,500	38,805	1926	8,067,873	645,429
1897	596,000	20,264	1927	2,748,440	173,151
1898	655,000	23,907	1928	1,882,795	109,102
1899	721,000	30,642	1929	1,428,777	90,014
1900	1,040,000	41,600	1930	3,542,796	176,241
1901	720,500	28,820	1931	3,934,240	145,568
1902	349,440	12,230	1932	2,418,626	72,480
1903	110,000	3,960	1933	772,463	28,583
1904	124,000	5,270			
1905	533,680	25,083	Totals	196.791,561	$11,612,655
1906	338,718	19,307			

[a] Quantities for 1877–1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.
[b] Estimated.
[c] Quantities and values for 1883–1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883–1886, respectively.
[d] Data from 1887 to date from reports of California State Mining Bureau.

MANGANESE

Bibliography: State Mineralogist Reports XII–XV (inc.), XVIII, XXII–XXVII (inc.), XXIX. Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

During 1933, there was no mangnese ore reported produced in California.

Imports of foreign manganese ore into the United States[1] during 1933, mainly from Soviet Russia, Gold Coast and Brazil, amounted to a total of 175,657 short tons of ore containing 88,917 tons of manganese valued at $1,378,322 compared with 124,022 tons of ore containing 53,553 tons of manganese valued at $1,219,383 in 1932.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore (including

[1] U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, Dec., 1933.

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ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese."

Manganese Ore Production in California, by Years.

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's ouput of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887	1,000	$9,000	1911	2	$40
1888	1,500	13,500	1912	22	400
1889	53	901	1913	----------	----------
1890	386	3,176	1914	150	1,500
1891	705	3,830	1915	4,013	49,098
1892	300	3,000	1916	13,404	274,601
1893	270	4,050	1917	15,515	396,659
1894	523	5,512	1918	26,075	979,235
1895	880	8,200	1919	11,569	451,422
1896	518	3,415	1920	2,892	62,323
1897	504	4,080	1921	1,005	12,210
1898	440	2,102	1922	540	7,650
1899	295	3,165	1923	690	10,620
1900	131	1,310	1924	1,115	25,785
1901	425	4,405	1925	832	19,450
1902	870	7,140	1926	235	4,700
1903	1	25	1927	----------	----------
1904	60	900	1928*	733	8,216
1905	----------	----------	1929*		
1906	1	30	1930*	207	2,576
1907	1	25	1931*		
1908	321	5,785	1932	----------	----------
1909	3	75			
1910	265	4,235	Totals	88,451	$2,394,346

* Annual details concealed under 'Unapportioned.'

MOLYBDENUM

Bibliography: State Mineralogist Reports XIV, XVII–XXIV (inc.), XXVI–XXVIII (inc.). Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten, and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wolfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses associated with copper sulphides. The first recorded commercial shipments of molybdenum ore in California were during the war 1916–

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1918. Some development work has been recently done on a high-grade deposit at the head of the Kaweah River, Tulare County.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present quotations on molybdenum ores are 42¢ per pound of MoS_2 contained, delivered at Pittsburgh, Pa., and on ferromolybdenum are 95¢ per pound Mo, 50%-60% Mo f.o.b. shipping point.

During 1933 there was a small amount of molybdenum concentrates shipped in California, details of which are concealed under the 'unapportioned' item. This material came from Inyo County and had been mined for several years. There was also a prospect in Mono County from which several tons of ore were mined, but no shipments were reported during the year.

Molybdenum Production of California, by Years.

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	*Tons*	*Value*
1916	8	$9,945
1917	243	9,014
1918	*	300
1919	---	------
1933	[a]	[a]
Totals	251	$19,259

* 300 pounds of 90% MoS_2 concentrate.
[a] Annual details concealed under 'Unapportioned.'

NICKEL

Bibliography: State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present quotations for nickel are around 35¢-36¢ per pound for the refined metal.

OSMIUM (see under Platinum)

PALLADIUM (see under Platinum)

PLATINUM

Bibliography: State Mineralogist Reports IV, VIII, IX, XII–XXVI (inc.), XXVIII. Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217–218.

In California the platinum group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Sacramento, Stanislaus, Shasta and Yuba counties, with a small amount coming from the hydraulic

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and surface-sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

The production of platinum-group metals in California during 1933 totaled 438 ounces crude, of which only 269 ounces crude were sold, containing 236 fine ounces valued at $7,255, compared with 278 fine ounces worth $8,142 in 1932. This metal came from properties in Butte, Del Norte, Mendocino, Merced, Sacramento, Shasta, Stanislaus, Trinity and Yuba counties. Of the 236 fine ounces, 167 ounces were platinum; 24 ounces, iridium; 22 ounces, osmium; 11 ounces, osmiridium; 1 ounce, palladium; and 11 ounces ruthenium.

Prices.

The average prices during 1933 for the various platinum group metals per fine ounce, according to refiners' reports, as given by the U. S. Bureau of Mines[a] were: platinum, $30.75; palladium, $18.30; iridium, $54.30; osmium, $56; rhodium, $53.50; and ruthenium, $75, compared with the 1932 prices, which were: platinum, $31.76; palladium, $17.75; iridium, $59.15; osmium, $52.50; rhodium, $46.50; and ruthenium, $41.20.

Platinum Production of California, by Years.

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887	416	$10,400	1912	603	$19,731
1888	100	400	1913	368	17,738
1889	500	2,000	1914	463	14,816
1890	500	2,000	1915	667	21,149
1891	600	2,500	1916	886	42,642
1892	100	500	1917	610	43,719
1893	80	440	1918	571	42,788
1894	75	517	1919	*418	60 611
1895	100	600	1920	477	68,977
1896	150	900	1921	613	58,754
1897	162	944	1922	795	90,288
1898	150	900	1923	602	78,546
1899	300	1,800	1924	273	36,452
1900	300	1,800	1925	292	39,937
1901	400	2,500	1926	322	32,005
1902	250	3,200	1927	139	10,749
1903	39	468	1928	312	27,902
1904	70	1,052	1929	212	14,416
1905	123	1,849	1930	217	11,700
1906	200	3,320	1931	305	11,979
1907	91	1,647	1932	278	8,142
1908	300	6,255	1933	236	7,255
1909	706	13,414			
1910	337	8,386	Totals	16,213	$842,961
1911	511	14,873			

* Fine ounces, beginning with 1919.

QUICKSILVER

Bibliography: State Mineralogist Reports IV, V, XII–XV, XVII–XXIX (inc.). Bulletins 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

The production of quicksilver in California during 1933 was 4102 flasks valued at $229,472. This was a decrease in both quantity and value as compared with the 1932 output, which was 5349 flasks worth

[a] U. S. Bureau of Mines, Mineral Market Report 268, Aug. 2, 1934.

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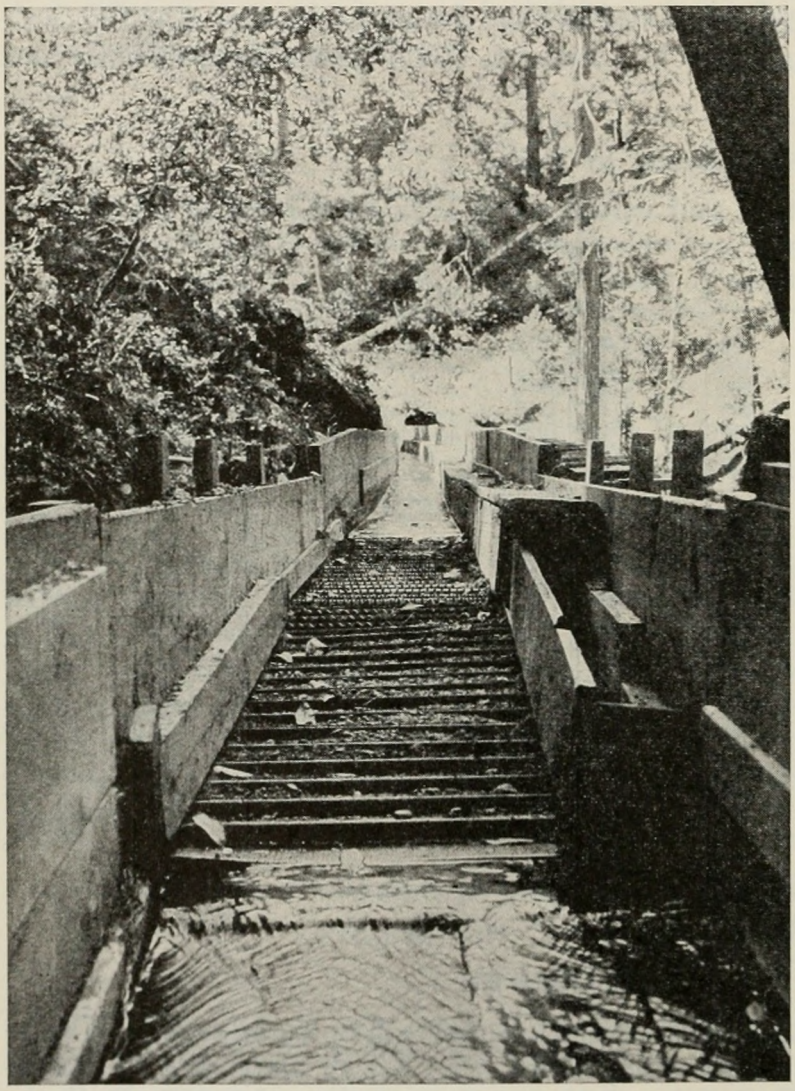
$279,780. The distribution of the 1933 output of quicksilver by counties was as follows:

County	*Flasks*	*Value*
Lake	1,610	$90,592
Napa	842	47,059
San Benito	711	38,765
San Luis Obispo	285	15,759
Santa Clara	93	5,204
Sonoma	128	7,022
Colusa, Kern, Kings, Fresno, Monterey, Orange, Santa Barbara, and Trinity *	433	25,071
Totals	4,102	$229,472

* Combined to conceal the output of individual operators in each.

Prices.

During 1933 the average for New York monthly quotation[1] was $59.227 per 76-pound flask. The average price for January was $48.50 per flask, raising to $66.50 per flask for October, and ending the year at $66.33 per flask. The average amount received by producers in California during 1933, according to reports received by the Division of Mines, was $55.94 per 76-pound flask, compared with $52.30 per flask in 1932.



Sluice boxes for cinnabar gravity separation at Big Boy Cinnabar Mine, Del Norte County.
Photo by John H. Maxson.

The U. S. Bureau of Mines[2] reported the total production of the United States for 1933 at 9402 flasks valued at $556,852. California was by a considerable margin the largest producing state with approximately 40 per cent of the total, other producing states being Oregon, Nevada, Texas, Arkansas, Washington, and Utah. The national production for 1932 was 12,622 flasks worth $731,129.

During 1933 imports of quicksilver amounted to 22,555 flasks worth $778,007, of which 17,007 flasks came from Spain, 3212 flasks from

[1] Engineering and Mining Journal, Vol. 133, 1932.
[2] U. S. Bureau of Mines Mineral Market Rept. 209, June 9, 1933.

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Italy, and the remainder from Mexico and the United Kingdom. The 1933 imports showed an increase over those of 1932, which were 8114 flasks worth $231,414.

Total Quicksilver Production of California.

Total amount and value of the quicksliver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and has been in practically continuous operation since 1846 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained 76½ pounds; then 75 pounds upto and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850–1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883–1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850	7,723	$768,052	$99 45	1893	30,164	$1,108,527	$36 75
1851	27,779	1,859,248	66 93	1894	30,416	934,000	30 70
1852	20,000	1,166,600	58 33	1895	36,104	1,337,131	37 04
1853	22,284	1,235,648	55 45	1896	30,765	1,075,449	34 96
1854	30,004	1,663,722	55 45	1897	26,691	993,445	37 28
1855	33,000	1,767,150	53 55	1898	31,092	1,188,626	38 23
1856	30,000	1,549,500	51 65	1899	29,454	1,405,045	47 70
1857	28,204	1,374,381	48 73	1900	26,317	1,182,786	44 94
1858	31,000	1,482,730	47 83	1901	26,720	1,285,014	48 46
1859	13,000	820,690	63 13	1902	29,552	1,276,524	43 20
1860	10,000	535,500	53 55	1903	32,094	1,335,954	42 25
1861	35,000	1,471,750	42 05	1904	[a] 28,876	1,086,323	37 62
1862	42,000	1,526,700	36 35	1905	24,655	886,081	35 94
1863	40,531	1,705,544	42 08	1906	19,516	712,334	36 50
1864	47,489	2,179,745	45 90	1907	17,379	663,178	38 16
1865	53,000	2,432,700	45 90	1908	18,039	763,520	42 33
1866	46,550	2,473,202	53 13	1909	16,217	773,788	47 71
1867	47,000	2,157,300	45 90	1910	17,665	799,002	45 23
1868	47,728	2,190,715	45 90	1911	19,109	879,205	46 01
1869	33,811	1,551,925	45 90	1912	20,600	866,024	42 04
1870	30,077	1,725,818	57 38	1913	15,661	630,042	40 23
1871	31,686	1,999,387	63 10	1914	11,373	557,846	49 05
1872	31,621	2,084,773	65 93	1915	14,199	1,157,449	81 52
1873	27,642	2,220,482	80 33	1916	21,427	2,003,425	93 50
1874	27,756	2,919,376	105 18	1917	24,382	2,396,466	98 29
1875	50,250	4,228,538	84 15	1918	22,621	2,579,472	114 03
1876	75,074	3,303,256	44 00	1919	15,200	1,353,381	89 04
1877	79,396	2,961,471	37 30	1920	10,278	775,527	75 45
1878	63,880	2,101,652	32 90	1921	3,157	140,666	44 56
1879	73,684	2,194,674	29 85	1922	3,466	191,851	55 35
1880	59,926	1,857,706	31 00	1923	5,458	332,851	60 98
1881	60,851	1,815,185	29 83	1924	7,948	543,080	68 33
1882	52,732	1,488,624	28 23	1925	7,683	621,831	80 81
1883	46,725	1,343,344	28 75	1926	5,892	516,382	87 64
1884	31,913	973,347	30 50	1927	6,488	714,418	111 67
1885	32,073	986,245	30 75	1928	[b] 7,107	844,649	118 84
1886	29,981	1,064,326	35 50	1929	10,152	1,195,705	117 78
1887	33,760	1,430,749	42 38	1930	11,374	1,255,257	110 36
1888	33,250	1,413,125	42 50	1931	13,478	1,121,624	83 22
1889	26,464	1,190,880	45 00	1932	5,349	279,780	52 30
1890	22,926	1,203,615	52 50	1933	4,102	229,472	55 94
1891	22,904	1,036,406	45 25				
1892	27,993	1,139,595	40 71	Totals	2,777,481	$114,688,406	

[a] Flasks of 75 lbs. since June, 1904; of 76½ lbs. previously.
[b] Flasks of 76 pounds, from January, 1928.

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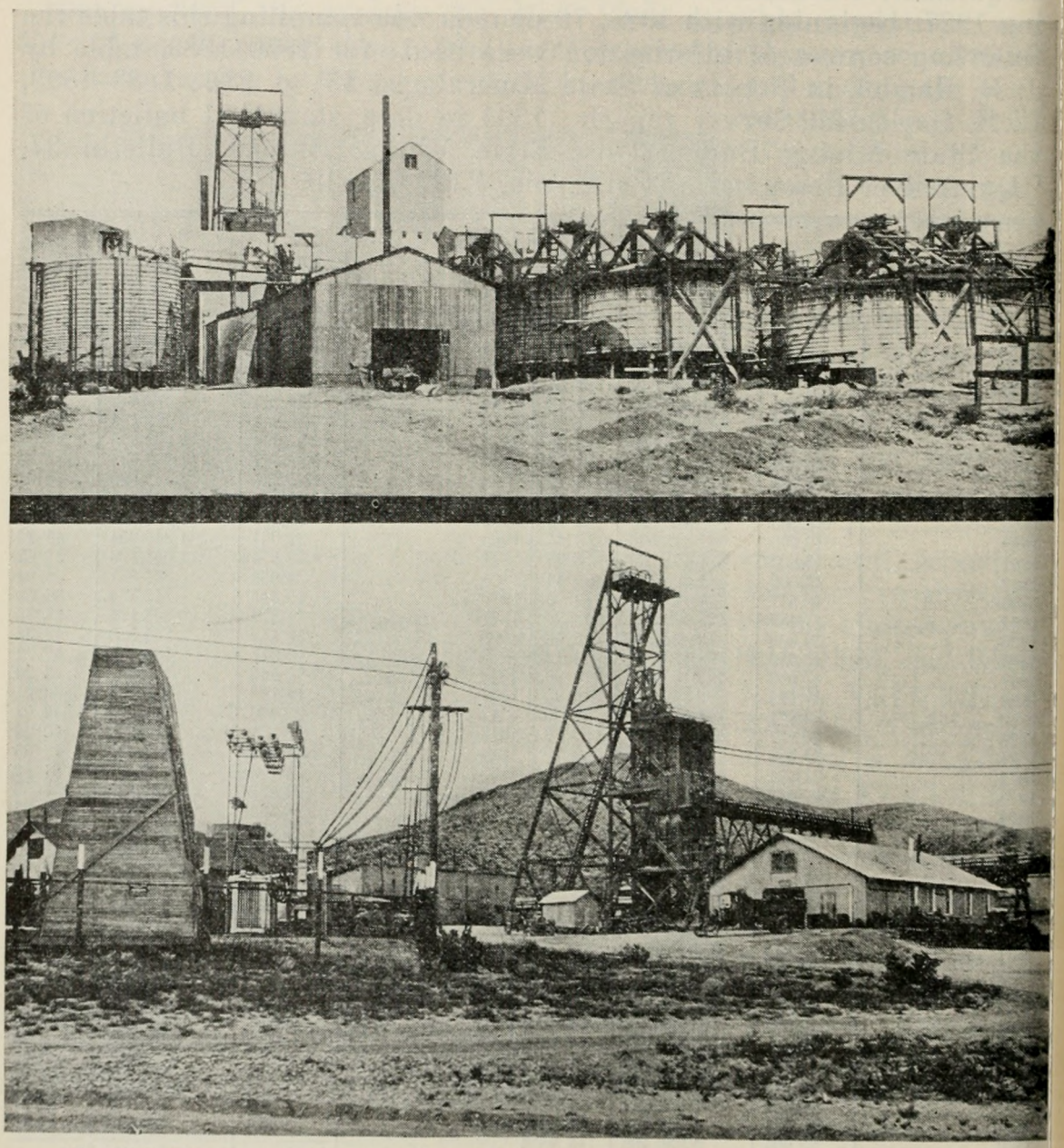
SILVER

Bibliography: State Mineralogist Reports IV, VIII, XII–XXX (inc.). Bulletins 67, 91. Min. & Sci. Press, March 1, 1919.

The 1933 silver production in California totaled 402,591 fine ounces valued at $140,907, as compared with the 1932 output of 493,533 fine ounces worth $139,176. Of the 1933 output there were 20,460 fine ounces worth $7,161, from placers. The average price of domestic silver was 35.0¢ per fine ounce in 1933 compared with 28.2¢ per ounce in 1932, and 29¢ per ounce in 1931.



Cyanide Plant at California Rand Mine, at Osdick, San Bernardino County.
No. 3 shaft of California Rand Mine in Kern County.

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Distribution of the 1933 silver production by counties was as follows:

County	*Fine ounces*	*Value*
Alpine	3,118	$1,091
Amador	18,489	6,471
Butte	2,774	971
Calaveras	5,505	1,927
Del Norte	9	3
El Dorado	4,165	1,458
Fresno	137	48
Humboldt	30	11
Imperial	218	76
Inyo	20,949	7,332
Kern	39,909	13,968
Lassen	194	68
Los Angeles	337	118
Madera	2,034	712
Mariposa	3,177	1,112
Merced	1,744	610
Modoc	37	13
Mono	2,869	1,004
Nevada	160,311	56,109
Orange	2	1
Placer	1,357	475
Plumas	1,149	402
Riverside	300	105
Sacramento	5,052	1,768
San Bernardino	96,619	33,817
San Diego	68	24
San Joaquin	4	1
Santa Barbara	20	7
Santa Cruz	3	1
Shasta	19,554	6,844
Sierra	3,352	1,173
Siskiyou	1,959	686
Stanislaus	689	241
Trinity	2,194	768
Tulare	40	280
Tuolumne	800	19
Ventura	54	54
Yuba	3,369	1,179
Totals	402,591	$140,907

The following paragraph is quoted from the U. S. Bureau of Mines, chapter on Gold and Silver from Mineral Year Book 1933–34 by courtesy of F. W. Horton and H. M. Gaylord:

"Silver. The silver output of California in 1933 was 402,591 ounces, as compared with 493,535 ounces in 1932, a decrease of 18 per cent. The production of lode silver was 382,131 ounces or 95 per cent of the total output but 20 per cent less than in 1932. The silver recovered from crude placer gold amounted to 20,460 ounces or 5 per cent of the total output, and an increase of 3,860 ounces or 23 per cent more than the placer output of silver in 1932. Nevada was the only county in the State that produced over 150,000 ounces of silver and this was entirely a by-product of gold mining and came almost wholly from the Grass Valley-Nevada City district. San Bernardino, Kern, and Inyo counties, in the order given, each produced between 20,000 and 100,000 ounces of silver in 1933, most of which was derived from the Randsburg, Mojave, and Cerro Gordo districts. Of the total silver output 65 per cent was recovered from gold ore, 24 per cent from gold-silver ore, 5 per cent from lead ore, 1 per cent from copper ore, and less than one-quarter per cent from dry silver ore. Of the total silver derived from lode mines, 37 per cent was recovered by amalgamation, 30 per cent by smelting concentrates, 20 per cent by smelting ore, old tailings, and mill cleanings, and 13 per cent by cyanidation."

Silver Production of California, by Years.

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880–1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880–1896

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(inc.) were based on 'coinage value' ($1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847). From 1905 to date, the figures are those of the U. S. Geological Survey and its successors, the U. S. Bureau of Mines.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880	882,169	$1,014,494	$1 15	1908	1,647,278	$873,057	$0 53
1881	580,091	655,503	1 13	1909	2,098,253	1,091,092	52
1882	653,569	745,069	1 14	1910	1,840,085	993,646	54
1883	1,129,244	1,253,461	1 11	1911	1,270,445	673,336	53
1884	3,236,987	3,593,056	1 11	1912	1,300,136	799,584	615
1885	1,986,260	2,125,298	1 07	1913	1,378,399	832,553	604
1886	1,245,747	1,233,290	0 99	1914	1,471,859	813,938	553
1887	1,262,282	1,237,036	0 98	1915	1,678,756	851,129	507
1888	1,314,874	1,235,982	0 94	1916	2,564,354	1,687,345	658
1889	823,947	774,510	0 94	1917	1,775,431	1,462,955	824
1890	820,336	861,353	1 05	1918	1,427,711	1,427,711	1 00
1891	737,224	729,852	0 99	1919	1,107,189	1,240,051	1 12
1892	358,575	311,960	87	1920	1,706,327	1,859,896	1 09
1893	415,468	324,065	78	1921	3,629,223	3,629,223	1 00
1894	229,896	144,834	63	1922	3,100,065	3,100,065	1 00
1895	463,911	301,542	65	1923	3,559,443	2,918,743	82
1896	326,757	222,195	68	1924	3,555,133	2,381,952	67
1897	754,648	452,789	60	1925	3,054,416	2,119,765	694
1898	701,788	414,055	59	1926	2,022,460	1,262,015	624
1899	855,869	513,521	60	1927	1,620,242	918,677	567
1900	1,168,157	724,257	62	1928	1,478,771	865,081	585
1901	950,831	570,499	60	1929	1,176,895	627,285	533
1902	1,163,041	616,412	53	1930	1,622,803	624,779	385
1903	958,230	517,444	54	1931	867,818	251,667	290
1904	1,441,259	835,929	58	1932	493,533	139,176	282
1905	1,076,174	650,009	61	1933	402,591	140,907	350
1906	1,220,641	817,830	68				
1907	1,138,856	751,646	66	Totals	75,746,447	$57,213,519	

TIN

Bibliography: Reports XV, XVII, XVIII, XXV. Bulletins 67, 91.

In 1928 and 1929 there was a small amount of tin produced from Californian ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891–1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets have been taken out.

Total Output of Tin in California

Year	*Pounds*	*Value*
1891	125,289	$27,564
1892	126,000	32,400
1928}	*	*
1929}		
Totals	251,289	$59,964

* Annual details concealed under 'Unapportioned.'

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TITANIUM

Bibliography: State Mineralogist's Report XXIII.

During 1933 there was no production of titanium ores reported in California. In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at $150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The market price of titanium minerals varies as to the titanium oxide it contains. Rutile 94% TiO at 10¢ a pound, ilmenite 45 to 52% TiO at $10 to $12 a ton, and ilmenite 32 to 35% TiO at $7 to $8 a ton, all prices Atlantic seaboard.

TUNGSTEN

Bibliography: Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.). Bulletins 38, 67, 91, 95. U. S. G. S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666–669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920–1922 (inclusive). The material shipped in 1933 was high-grade sorted ore and concentrates, coming from a single property each in Inyo, San Bernardino and Tulare counties. A total of 140 tons was reported produced, yielding 148 tons recalculated to 60% WO_3, valued at $76,605.

Quotations in "Metal and Minerals Markets" during 1933 ranged from $9.50 to $15 per unit WO_3 for Chinese wolframite, duty paid; $9.50 to $15 per unit WO_3 for Bolivian scheelite, duty paid; from $8 to $15 for domestic scheelite. The highest prices were received at the end of the year. Present prices per unit WO_3 at New York are: Chinese wolframite, duty paid, $16.50 to $16.75; Bolivian scheelite, $16.50; domestic scheelite, $16.50.

Imports of foreign tungsten ores and alloys into the United States during 1933, according to the U. S. Bureau of foreign and Domestic Commerce was 1,230,608 pounds valued at $162,060, compared with 191,816 pounds worth $19,365 in 1932. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hübernite (manganese tungstate) also occur. The deposits at Atolia are the largest and most productive scheelite deposits known.

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Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60% WO_3:

Year	Tons at 60% WO_3	Value	Year	Tons at 60% WO_3	Value
1905	57	$18,800	1919	214	$219,316
1906	485	189,100	1920		
1907	287	120,587	1923	34	19,126
1908	105	37,750	1924	781	446,009
1909	577	190,500	1925	573	348,475
1910	457	208,245	1926	441	316,560
1911	387	127,706	1927*	398	429,237
1912	572	206,000	1928*		
1913	559	234,673	1929	150	106,280
1914	420	180,575	1930*	120	82,582
1915	962	1,005,467	1931*		
1916	2,270	4,571,521	1932	26	9,509
1917	2,466	3,079,013	1933	148	76,605
1918	1,982	2,832,222	Totals	14,471	$15,055,854

* Annual details concealed under 'Unapportioned.'

VANADIUM

Bibliography: Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

Present New York quotations for ferrovanadium are $2.70–$2.90 per pound of vanadium f.o.b. works, and vanadium ore 26¢ per pound V_2O_5 contained.

ZINC

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XX–XXIV, XXVI, XXVII. Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1933 amounted to 290,222 pounds valued at $12,189. This material was flotation concentrates coming as a by-product from a gold mine in Nevada County and carbonate ore from Inyo County.

There was no zinc ore reported shipped during 1932 in California.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The production of metallic zinc[1] at reduction plants in the United States during 1933 amounted to 337,269 short tons valued at $28,331,000 of which 1172 tons were reduced from foreign ores and 20,087 tons from secondary metal. The 1933 output was an increase over that of 1932, which was 221,866 short tons worth $13,312,000.

[1] U. S. Bureau of Mines, Mineral Market Report 270, April 19, 1934.

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The average price per pound for zinc in 1933 was 4.2¢, compared with 3.0¢ in 1932, 3.8¢ in 1931, 4.8¢ in 1930 and 6.5¢ in 1929.

Total Zinc Production of California.

Total figures for zinc output of the state are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906	206,000	$12,566	1920	1,188,009	$96,229
1907	177,759	10,598	1921	846,184	42,309
1908	54,000	3,544	1922	3,034,430	172,963
1909			1923		
1910			1924	3,060,000	198,900
1911	2,679,842	152,751	1925	11,546,602	877,542
1912	4,331,391	298,866	1926	20,447,559	1,533,568
1913	1,157,947	64,845	1927	8,625,004	552,000
1914	399,641	20,381	1928		
1915	13,043,411	1,617,383	1929		
1916	15,950,565	2,137,375	1931	149,865	5,314
1917	11,854,804	1,209,190	1932		
1918	5,565,516	506,466	1933	290,222	12,189
1919	1,384,192	101,046			
			Totals	105,992,991	$9,626,025

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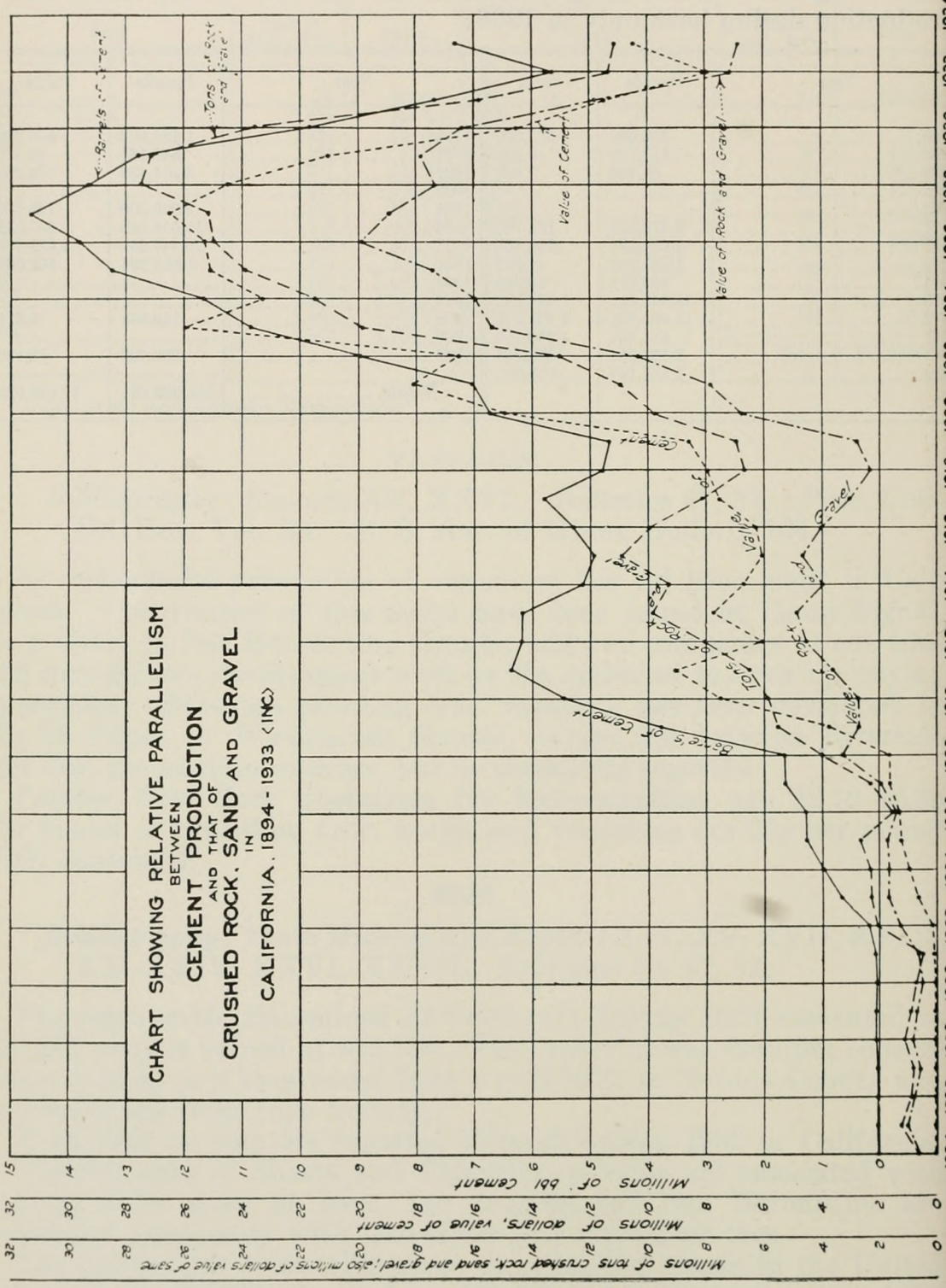

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CHAPTER FOUR

STRUCTURAL MATERIALS

Bibliography: State Mineralogist Reports XII–XXVIII (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which was previously listed under structural material in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1933 was valued at $19,444,544, as compared with a total value of $17,677,445 for the year 1932, the decrease being mainly due to miscellaneous stone, cement, brick and hollow building tile, though all other materials in this group, with the exception of bituminous rock, showed decreases in both amount and total value.

In 1933 all counties, with the exception of Alpine, Kings, and Sutter, contributed to this structural total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification and in 1926 every county contributed one or more substances to the group.

The following summary shows the value of the structural materials produced in California during the years 1932–1933, with increases or decreases in each instance:

Substance	1932		1933		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Brick and hollow building tile		$1,605,086		$1,520,481	$84,605—
Cement	5,657,549 bbls.	7,967,107	7,284,031 bbls.	10,331,395	2,364,288+
Granite		398,676		183,706	214,970—
Lime	27,510 tons	254,223	33,425 tons	271,619	17,396+
Marble[a]		42,505		23,178	19,327—
Sandstone		13,286		10,888	2,398—
Slate	*	*	5,343 tons	31,958	*
Stone, miscellaneous		7,183,643		6,871,581	312,062—
Unapportioned		[b]212,919		[c]199,738	13,181—
Total value		$17,677,445		$19,444,544	
Net increase					$1,767,099

* Included under 'Unapportioned.'
[a] Includes onyx and travertine.
[b] Includes bituminous rock, chromite, magnesite, slate, tube-mill pebbles.
[c] Includes bituminous rock, magnesite, tube-mill pebbles.

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ASPHALT

Bibliography: State Mineralogist Reports VII, X, XII–XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself. However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

BITUMINOUS ROCK

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1933 shipments of bituminous rock were made from Santa Barbara and Santa Cruz counties with a single producer in each. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The total of the 1931 and 1932 yields was 23,653 tons worth $109,140. The 1933 output showed a slight decrease in both quantity and value from that of 1932.

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Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887	36,000	$160,000	1912	44,073	$87,467
1888	50,000	257,000	1913	37,541	78,479
1889	40,000	170,000	1914	66,119	166,618
1890	40,000	170,000	1915	17,789	61,468
1891	39,962	154,164	1916	19,449	66,561
1892	24,000	72,000	1917	5,590	18,580
1893	32,000	192,036	1918	2,561	9,067
1894	31,214	115,193	1919	4,614	18,537
1895	38,921	121,586	1920	5,450	27,825
1896	49,456	122,500	1921	8,298	43,192
1897	45,470	128,173	1922	4,624	13,570
1898	46,836	137,575	1923	2,945	11,780
1899	40,321	116,097	1924	6,040	14,922
1900	25,306	71,495	1925	2,681	10,724
1901	24,052	66,354	1926	3,863	21,577
1902	33,490	43,411	1927	3,515	17,704
1903	21,944	53,106	1928	4,966	33,832
1904	45,280	175,680	1929	3,320	14,360
1905	24,753	60,436	1930	8,525	36,075
1906	16,077	45,204	1931	23,653	109,140
1907	24,122	72,835	1932		
1908	30,718	109,818	1933	*	*
1909	34,123	116,436			
1910	87,547	165,711	Totals	1,232,333	$3,875,567
1911	75,125	117,279			

* Annual details concealed under 'Unapportioned.'

BRICK AND HOLLOW TILE

Bibliography: State Mineralogist Reports VIII, X, XII–XV (inc.), XVII–XXVIII (inc.). Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5–6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius.

We also include under this heading the various forms of hollow building 'tile' or blocks. The application of this title to residence construction as well as to other structures has grown, although their total output for 1933 showed a decrease in value and tonnage as compared with the 1932 production.

The 1933 output of all kinds of brick showed a decrease in their total values of about 18 per cent and in amounts about 16 per cent, as compared with that of 1932. The 1933 production consisted of 57,905 M of common brick valued at $549,550; 15,871 M of fire brick valued at $657,393; 2253 M of glazed, pressed, fancy, vitrified paving brick, etc., valued at $108,772; and 25,814 tons of hollow building tile valued at $204,266, which gave a total value for the year for brick and hollow building tile of $1,520,481. The 1932 output had a total value of $1,605,086.

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Los Angeles County had the largest output with nineteen operating plants, which made 30,634 M common brick worth $268,955; 8749 M of fire brick worth $322,886; 617 M of fancy, pressed and glazed brick worth $48,013; and 3410 tons of hollow building tile worth $19,832. Contra Costa County had three operating plants with an output of a total value of $268,235; Alameda County with three operating plants, having a total value of $179,152; Sacramento County with three plants, having an output of $75,081; Santa Clara County with three plants, had an output valued at $46,384. There were two operating plants each in Amador, Orange, Riverside, San Diego and San Joaquin counties; one each in Kern, Marin, Placer, San Bernardino, San Luis Obispo, Tulare and Ventura counties.

Brick and Hollow Tile Production of California, by Years.

Record of brick production in the State has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	*Brick, M*	*Hollow building blocks, tons*	*Value*
1893	103,900	------	$801,750
1894	81,675	------	457,125
1895	131,772	------	672,360
1896	24,000	------	524,740
1897	97,468	------	563,240
1898	100,102	------	571,362
1899	125,950	------	754,730
1900	137,191	------	905,210
1901	130,766	------	860,488
1902	169,851	------	1,306,215
1903	214,403	------	1,999,546
1904	281,750	------	1,994,740
1905	286,618	------	2,273,786
1906	277,762	------	2,538,848
1907	362,167	------	3,438,951
1908	332,872	------	2,506,495
1909	333,846	------	3,059,929
1910	340,883	------	2,934,731
1911	327,474	------	2,638,121
1912	337,233	------	2,940,290
1913	358,754	------	2,915,350
1914	270,791	------	2,288,227
1915	180,538	------	1,678,756
1916	206,960	------	2,096,570
1917	192,269	29,348	2,532,721
1918	136,374	34,818	2,363,481
1919	156,328	36,026	3,087,067
1920	245,842	99,208	5,704,393
1921	238,022	67,100	5,570,875
1922	374,853	105,909	7,994,991
1923	397,754	122,534	9,738,082
1924	456,716	114,469	9,137,908
1925	361,094	105 491	7,503,976
1926	388,048	90,332	7,026,124
1927	374,111	75,116	6,516,077
1928	272,443	66,277	5,694,770
1929	327,011	66,713	5,607,410
1930	267,019	68,047	4,205,460
1931	151,545	51,988	2,560,415
1932	90,683	27,098	1,605,086
1933	76,905	25,814	1,520,481
Totals	10,021,743	1,186,288	$131,090,877

CEMENT

Bibliography: State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI–XXVIII (inc.). Bulletin 38.

During 1933 there was a production in California of 7,284,031 barrels of cement valued at $10,331,375 f.o.b. plant, being an increase in

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both quantity and value from that of the previous year. The 1932 output was 5,657,549 barrels worth $7,967,107 or an average value of $1.40 per barrel. The average value per barrel in 1933 was $1.42.

During 1933 shipments were made from eleven plants in nine counties to the extent of 7,369,947 barrels valued at $10,520,083, as compared to those of 1932, which were 5,853,155 barrels worth $8,202,038. These plants employed 1440 men in 1933. Two plants were operating and another making shipments from stock on hand in San Bernardino County and a single operating plant in each of the following counties: Calaveras, Contra Costa, Kern, Los Angeles,[1] Merced, Riverside, San Mateo and Santa Cruz.

Cement Production of California, by Years.

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859–60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then $4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to $2.50 a barrel, about the same as it is today."[2]

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the state. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920–1931 annually exceeded the value of her gold output.

Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891	5,000	$15,000	1914	5,109,218	$6,558,148
1892	5,000	15,000	1915	4,918,275	6,044,950
1893			1916	5,299,507	6,210,293
1894	8,000	21,600	1917	5,790,734	7,544,282
1895	16,383	32,556	1918	4,772,921	7,969,909
1896	9,500	28,250	1919	4,645,289	8,591,990
1897	18,000	66,000	1920	6,709,160	14,962,945
1898	50,000	150,000	1921	7,404,221	18,072,120
1899	60,000	180,000	1922	8,962,135	16,524,056
1900	52,000	121,000	1923	10,825,405	25,999,203
1901	71,800	159,842	1924	11,655,131	23,225,850
1902	171,000	423,600	1925	13,206,630	25,043,335
1903	640,868	968,727	1926	13,797,173	25,269,678
1904	969,538	1,539,807	1927	14,661,783	26,474,935
1905	1,265,553	1,791,916	1928	13,625,231	24,463,287
1906	1,286,000	1,941,250	1929	12,794,729	21,038,565
1907	1,613,563	2,585,577	1930	9,831,938	14,575,731
1908	1,629,615	2,359,692	1931	7,693,712	11,510,655
1909	3,779,205	4,969,437	1932	5,657,549	7,967,107
1910	5,453,193	7,485,715	1933	7,284,031	10,331,395
1911	6,371,369	9,085,625			
1912	6,198,634	6,074,661	Totals	210,486,799	$356,136,703
1913	6,167,806	7,743,024			

[1] The plant in Los Angeles County grinds clinker coming from San Bernardino County, therefore the crude material is credited to the latter.

[2] Monthly Review of Mercantile Trust Co. of Cal., Vol. XIII, No. 3, p. 55, Mar., 1924.

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GRANITE

Bibliography: State Mineralogist Reports X, XII–XXVI (inc.), XXVIII. Bulletin 38.

The 1933 output of granite consisted of 62,495 cu. ft. of building stone valued at $101,482; 50,632 cu. ft. of monumental stone valued at $78,677; 5055 linear ft. of curbing valued at $1,902; and 4408 cu. ft. of unclassified material, including a small amount of tuff and some volcanic rock which was used as building stone and flagstone, having a value of $1,645; giving the total value of the year as $183,706. This was a decrease from the 1932 total, which was $298,675. The 1933 material came from nineteen quarries in eleven counties, four of which were in San Diego, with two each in Fresno, Lassen, Placer, and Sonoma counties; and one each in Madera, Mariposa, Nevada, Tulare, and Ventura counties.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put. It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

Varieties.

For building purposes, the granites found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County, and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notably at Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also a similar 'black granite' in Tulare County, near Success.

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Granite Production of California, by Years.

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887	$150,000	1912	$362,975
1888	57,000	1913	981,277
1889	1,329,018	1914	628,786
1890	1,200,000	1915	227,928
1891	1,300,000	1916	535,339
1892	1,000,000	1917	221,997
1893	531,322	1918	139,861
1894	228,816	1919	220,743
1895	224,329	1920	495,732
1896	201,004	1921	725,901
1897	188,024	1922	676,643
1898	147,732	1923	760,081
1899	141,070	1924	1,211,046
1900	295,772	1925	1,853,859
1901	519,285	1926	655,332
1902	255,239	1927	1,398,143
1903	678,670	1928	763,996
1904	467,472	1929	1,169,271
1905	353,837	1930	855,477
1906	344,083	1931	636,741
1907	373,376	1932	398,676
1908	512,923	1933	183,706
1909	376,834		
1910	417,898	Totals	$26,753,256
1911	355,742		

LIME

Bibliography: Reports XIV, XV, XVII–XXIX (inc.) Bulletin 38.

In California during 1933 there was an output of lime to the amount of 33,425 short tons valued at $271,619, coming from two plants each in El Dorado, San Bernardino and Santa Cruz counties, and one each in Alameda and Tuolumne counties. The above figures showed an increase in both quantity and value from those of 1932, which were 27,510 tons worth $254,223.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not separable. A portion is hydrated lime. Limestone utilized in sugar making for smelter flux, as a fertilizer, and other special industrial uses, are classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

Lime Production of California, by Years.

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels', as shown in the earlier reports, to 'tons' for the years 1894–1922 (inc.):

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Lime Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1894	37,350	$318,700	1915	35,653	$286,304
1895	39,776	386,094	1916	49,364	390,475
1896	30,275	261,505	1917	50,073	311,380
1897	28,780	252,900	1918	43,684	461,315
1898	29,786	254,010	1919	42,070	552,043
1899	29,985	314,575	1920	46,314	557,232
1900	31,252	283,699	1921	46,353	610,619
1901	31,738	334,688	1922	57,875	671,747
1902	44,866	369,616	1923	70,894	788,834
1903	49,659	418,280	1924	62,029	703,355
1904	57,945	571,749	1925	61,922	685,528
1905	61,700	555,322	1926	63,568	670,837
1906	68,927	763,060	1927	60,498	631,497
1907	68,422	756,376	1928	56,616	547,919
1908	39,639	379,243	1929	42,834	417,101
1909	52,075	577,824	1930	47,662	452,084
1910	47,951	477,683	1931	36,189	360,523
1911	42,959	390,988	1932	27,510	254,223
1912	52,212	464,440	1933	33,425	271,619
1913	61,344	528,547			
1914	43,996	378,663	Totals	1,885,270	$18,662,597

MAGNESITE

Bibliography: State Mineralogist Reports XII–XV (inc.), XVII–XXVII (inc.). Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450–453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305–388, 418–444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1933 came from a single property each in Santa Clara and Stanislaus counties, both being operated by the same company. The annual details are concealed under the 'Unapportioned' item to conceal the output of this single operator. Practically all was shipped in the cancined form.

The 1933 output showed an increase in both quantity and value from the 1932 figures. The 1932–1933 output showed a total of 40,303 short tons of crude magnesite valued at $282,325, of which only a small amount was sold as such. Most of this material was calcined. The operators, reports show that a total of 17,400 short tons of calcined material, valued at $524,350 rail shipping point, was shipped during 1932–1933, dead-burned and periclass for refractories and material for the plastic trade. From two to two and one-half tons of crude material are required to make one ton of calcined. The average price of crude magnesite reported for 1933 was $5,60 per ton, compared with $8.45 in 1931; $10.04 in 1930; $10.32 in 1929 and $10 in 1932.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property.

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Imports.

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic-calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick ¾¢ per lb., and 10 per cent ad valorem. The figures of imports for 1933, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 25,370 short tons valued at $375,061, as compared with 8920 tons worth $135,118 in 1932.

Total Magnesite Production of California.

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,[1] southeast of Livermore, Alameda County. Shipments amounting to 'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

Year	Tons	Value	Year	Tons	Value
1887	600	$9,000	1912	10,512	$105,120
1888	600	9,000	1913	9,632	77,056
1889	600	9,000	1914	11,438	114,380
1890	600	9,000	1915	30,271	283,461
1891	1,500	15,000	1916	154,052	1,311,893
1892	1,500	15,000	1917	209,648	1,976,227
1893	1,093	10,930	1918	83,974	803,492
1894	1,440	10,240	1919	44,696	452,094
1895	2,200	17,000	1920	83,695	1,033,491
1896	1,500	11,000	1921	47,837	511,102
1897	1,143	13,671	1922	55,637	594,665
1898	1,263	19,075	1923	73,963	946,643
1899	1,280	18,480	1924	67,236	900,183
1900	2,252	19,333	1925	64,623	872,944
1901	4,726	43,057	1926	50,915	587,642
1902	2,830	20,655	1927	46,093	577,887
1903	1,361	20,515	1928	45,645	501,590
1904	2,850	9,298	1929	47,269	488,014
1905	3,933	16,221	1930	38,681	388,472
1906	4,032	40,320	1931	21,576	182,283
1907	6,405	57,720	1932*	40,303	282,325
1908	10,582	80,822	1933/		
1909	7,942	62,588	Totals	1,325,806	$13,709,206
1910	16,570	113,887			
1911	8,858	67,430			

* Combined under "Unapportioned."

MARBLE

Bibliography: State Mineralogist Reports XII–XV (inc.), XVII–XXIX (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 106.

The 1933 production of marble in California was valued at $23,178 (including some onyx and travertine from Solano County and a small amount of limestone used as building stone and flagstone coming from

[1] See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

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an operator in Santa Barbara County). The marble came from a single quarry each in Amador and Tuolumne counties. The 1933 output showed a decrease in value from that of 1932, which was worth $42,505.

California has many beautiful and servicable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		$5,000	1912	27,820	$74,120
1888		5,000	1913	41,654	113,282
1889		87,030	1914	25,436	48,832
1890		80,000	1915	22,186	41,518
1891		100,000	1916	25,954	50,280
1892		115,000	1917	24,755	62,950
1893		40,000	1918	[a]17,428	49,898
1894	38,441	98,326	1919	25,020	74,482
1895	14,864	56,566	1920	[b]29,531	92,899
1896	7,889	32,415	1921	30,232	98,395
1897	4,102	7,280	1922	38,321	127,792
1898	8,050	23,594	1923	28,015	124,919
1899	9,682	10,550	1924	[b]31,579	140,253
1900	4,103	5,891	1925	35,664	116,105
1901	2,945	4,630	1926	34,806	119,999
1902	19,305	37,616	1927	[b]42,308	103,689
1903	84,624	97,354	1928	[b]34,324	82,190
1904	55,401	94,208	1929	[b]72,881	93,661
1905	73,303	129,450	1930	[b]65,775	82,194
1906	31,400	75,800	1931	[b]37,776	81,760
1907	37,512	118,066	1932	[b]25,506	42,505
1908	18,653	47,665	1933		23,178
1909	79,600	238,400			
1910	18,960	50,200	Total value		$3,459,045
1911	20,201	54,103			

[a] Includes onyx and serpentine.
[b] Includes onyx and travertine.

ONYX and TRAVERTINE

Bibliography: State Mineralogist Reports XII–XV (inc.), XVII, XVIII, XXI, XXIII. Bulletin 38.

Onyx and travertine are known to exist in a number of places in California, but there has been only a small and irregular production since the year 1896. In 1933 there was one producer of travertine in Solano County. The 1933 output showed a decrease in both quantity and value from that of 1932, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen desk sets, and other ornamental purposes.

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Onyx Production of California, by Years.

Production by years has been as follows:

Year	Value	Year	Value
1887	*	1922	$3,320
1888	$900	1923	2,510
1889	900	1924	*
1890	900	1925	16,120
1891	1,500	1926	7,575
1892	2,400	1927	*
1893	1,800	1928	*
1894	27,000	1929	*
1895	20,000	1930	*
1896	12,000	1931	*
1918	24,000	1932	*
1919	*	1933	*
1920			
1921	1,294	Total value	$122,219

* See under Marble.

SANDSTONE

Bibliography: State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1933 a total of 25,980 cu. ft. of sandstone valued at $10,888, was quarried in California and came from properties in Los Angeles, Monterey and Napa counties, by five operators; compared with 41,793 cu. ft. valued at $13,286 in 1932.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

A large portion of the standstone was sold for landscape work and used as stepping stones for walks and for fountains, walls, etc.

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Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		$175,000	1911	255,313	$127,314
1888		150,000	1912	66,487	22,574
1889		175,598	1913	62,227	27,870
1890		100,000	1914	111,691	45,322
1891		100,000	1915	63,350	8,438
1892		50,000	1916	17,270	10,271
1893		26,314	1917	31,090	7,074
1894		113,592	1918	900	400
1895		35,373	1919	5,400	3,720
1896		28,379	1920	10,500	2,300
1897		24,086	1921	10,150	2,112
1898		46,384	1922	900	1,100
1899	56,264	103,384	1923	7,000	13,000
1900	378,468	254,140	1924	6,700	3,600
1901	266,741	192,132	1925	14,704	14,362
1902	212,123	142,506	1926	34,100	17,500
1903	353,002	585,309	1927	22,900	205,400
1904	363,487	567,181	1928	134,100	43,250
1905	302,813	483,268	1929	177,655	49,881
1906	182,076	164,068	1930	160,704	56,404
1907	159,573	148,148	1931	110,244	30,960
1908	93,301	55,151	1932	41,793	13,286
1909	79,240	37,032	1933	25,980	10,888
1910	165,971	80,443			
			Total value		$4,554,514

SERPENTINE

Bibliography: State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switchboards. As there was but a single operator, the figures were combined with those of marble output for those years.

Serpentine Production of California, by Years.

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Total Serpentine Production in California

Year	Cubic feet	Value	Year	Cubic feet	Value
1895	4,000	$4,000	1904	200	$2,310
1896	1,500	6,000	1905		
1897	2,500	2,500	1906	847	1,694
1898	750	3,000	1907	1,000	3,000
1899	500	2,000	1917	[a]	[a]
1900	350	2,000	1918	[b]	[b]
1901	89	890	1919		
1902	512	5,065			
1903	99	800	Totals	12,347	$33,259

[a] Under 'Unapportioned.'
[b] See under Marble.

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SLATE

Bibliography: State Mineralogist Reports XV, XVIII, XXIV, XXVIII. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California for 1933 amounted to 5343 short tons valued at $31,958 f.o.b. rail-shipping point and came from a single property each in El Dorado, Inyo and Tuolumne counties. The 1933 figures showed an increase in both amount and value over those of the previous year. The 1932 output was concealed under 'Unapportioned' so as not to reveal the yield of either operator for that year. Practically all of this slate was crushed and used for roofing granules.

Total Production of Slate in California.

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889	4,500	$18,089	1908	6,000	$60,000
1890	4,000	24,000	1909	6,961	45,660
1891	4,000	24,000	1910	1,000	8,000
1892	3,500	21,000	1911		
1893	3,000	21,000	1915	1,000	5,000
1894	1,800	11,700	1916		
1895	1,350	9,450	1920	8	80
1896	500	2,500	1921		
1897	400	2,800	1922	200	2,400
1898	400	2,800	1923		
1899	810	5,900	1926	[a]	7,371
1900	3,500	26,250	1927	[b]2,686	17,960
1901	5,100	38,250	1928	[b]4,075	31,263
1902	4,000	30,000	1929	[b]8,220	71,347
1903	10,000	70,000	1930		
1904	6,000	50,000	1931	[b]8,234	55,182
1905	4,000	40,000	1932		
1906	10,000	100,000	1933	[b]5,343	31,958
1907	7,000	60,000	Total value		$898,960

* Annual details concealed under 'Unapportioned.'
[a] Quantity not shown as both 'squares' and 'tons' included.
[b] Tons.

MISCELLANEOUS STONE

Bibliography: State Mineralogist Reports XII–XXVIII (inc.). Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been

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tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

Both the output of sand and gravel and crushed rock in California during 1933 showed a marked decrease in both amount and value from that of the previous year. This resulted in a total value of $6,871,581 for 'miscellaneous stone' for 1933, as compared with $7,183,643 for 1932. As in the past several years, Los Angeles County led all counties by a wide margin in the annual output of these products, its 1933 yield being valued at $1,841,946 (compared with $1,990,053 in 1932); followed by Alameda County second with $649,105; San Diego County third with $374,796; followed in turn by Santa Clara, Contra Costa, Mariposa, Riverside, Shasta, San Benito, Tuolumne, Modoc, Sonoma, and San Bernardino counties.

Paving Blocks.

There was no production of paving blocks in California during the year 1933.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	$350,000	1911	4,141	$210,819
1888	10,500	367,500	1912	11,018	578,355
1889	7,303	297,236	1913	6,364	363,505
1890	7,000	245,000	1914	6,053	270,598
1891	5,000	150,000	1915	3,285	171,092
1892	*3,000	96,000	1916	1,322	54,362
1893	2,770	96,950	1917	938	38,567
1894	2,517	66,981	1918	372	17,000
1895	2,332	73,338	1919	27	1,350
1896	4,161	77,584	1920	63	3,155
1897	1,711	35,235	1921	4	280
1898	1,144	21,725	1922	72	3,924
1899	305	7,861	1923	15	880
1900	1,192	23,775	1924	11	935
1901	1,920	41,075	1925	27	1,350
1902	3,502	112,437	1926		
1903	4,854	134,642	1927	41	2,057
1904	3,977	161,752	1928	25	1,658
1905	3,408	134,347	1929		
1906	4,203	173,432	1930	[a] 66	5,900
1907	4,604	199,347	1931		
1908	7,660	334,780	1932		
1909	4,503	199,803			
1910	4,434	198,916	Totals	135,838	$5,325,503

* Figures for 1887–1892 (inc.) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.

[a] Annual details concealed under 'Unapportioned.'

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Grinding Mill Pebbles.

The 1933 output of grinding mill pebbles in California was combined under 'Unapportioned' to conceal the production of a single operator in San Diego County.

The amount and value of grinding mill pebbles, annually, follows:

Year	*Tons*	*Value*
1915	340	$2,810
1916	20,232	107,567
1917	21,450	90,538
1918	8,628	61,268
1919	2,607	19,272
1920	2,104	17,988
1921	247	1,418
1922	1,571	7,628
1923	2,650	14,936
1924	434	2,969
1925	215	1,385
1926	102	612
1927	288	1,800
1928	372	2,408
1929 } *	166	1,225
1930 }		
1931 } *	25	211
1932 }		
1933	*	*
Totals	61,431	$264,035

* Annual details concealed under 'Unapportioned.'

Sand and Gravel.

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.

The distribution of the 1933 output of sand and gravel by counties is given in the following table:

County	*Tons*	*Value*	*County*	*Tons*	*Value*
Alameda [a]	966,058	$582,342	San Joaquin	102,589	$47,976
Butte	18,084	10,082	Santa Barbara	67,441	38,019
Calaveras	25,591	21,870	Santa Clara	527,691	136,275
Contra Costa [a]	82,282	41,406	Shasta	106,568	65,558
Fresno	31,481	23,838	Sierra	6,450	2,833
Glenn	44,332	11,690	Siskiyou	29,139	18,016
Humboldt	13,193	6,197	Sonoma	222,179	112,179
Kern	49,170	336,911	Stanislaus	71,760	40,888
Lake	23,893	18,852	Tehama	37,734	24,353
Lassen	20,200	13,450	Trinity	2,325	2,375
Los Angeles [b]	1,789,005	737,638	Tulare	108,313	90,032
Mariposa	5,402	2,787	Tuolumne	2,940	1,904
Mendocino	37,866	28,369	Ventura [a]	178,847	97,432
Merced	22,900	12,875	Yuba	70,385	31,930
Modoc	7,160	4,000	Amador, Colusa, Del Norte, Imperial, Inyo, Placer, Plumas, San Luis Obispo, San Mateo [a], Santa Cruz and Yolo *	62,991	41,499
Mono	7,869	2,956			
Monterey [a, b]	61,194	58,791			
Napa	28,200	22,000			
Orange	45,582	25,256			
Riverside [a, b]	186,181	88,899			
Sacramento [a]	88,493	55,971			
San Bernardino	155,161	72,192			
San Diego [a, b]	310,783	248,331	Totals	5,617,432	$2,877,972

* Combined to conceal the output of a single operator in each.
[a] Includes molding sand.
[b] Includes blast sand.

Included in the above is a total of 17,516 tons of molding sand valued at $39,722 coming from two properties in Riverside County; and one each in Alameda, Contra Costa, Monterey, Sacramento, San Diego,

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San Luis Obispo, San Mateo and Ventura counties. The 1933 yield showed an increase compared with 1932, which was 16,746 tons worth $37,969.

Crushed Rock.

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

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Crushed Rock Production, by Counties, for 1933

County	Macadam and ballast		Rubble and riprap		Concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda	64,569	$18,876			*	*	53,726	$40,904	118,295	$59,780
Calaveras							6,059	24,566	6,059	24,566
Humboldt	51,619	58,815							51,619	58,815
Imperial	98,900	73,350	23,968	$13,112					122,868	86,462
Inyo	* 41,207	15,923							41,207	15,923
Kern	16,560	13,848			*	*	*	*	16,560	13,848
Lake	18,703	14,200							18,703	14,200
Lassen	15,495	21,778							15,495	21,778
Los Angeles	148,347	64,623	82,130	103,445	253,553	$187,931	1,087,162	748,309	1,571,192	1,104,308
Marin	10,811	9,929	15,685	14,785			145,739	144,592	172,235	169,306
Mariposa	171,250	209,324	470	4,937	23,240	16,584	43,768	46,384	238,728	277,229
Mono	11,592	17,398							11,592	17,398
Monterey					5,369	5,316			5,369	5,316
Nevada	18,000	24,400							18,000	24,400
Placer	71,310	40,800	1,312	886					72,622	41,686
Plumas	52,553	50,625							52,553	50,625
Riverside	189,302	109,718	*	*	*	*			189,302	109,718
San Bernardino	74,686	35,095	*	*	*	*	23,691	31,178	98,377	66,273
San Mateo	46,791	18,794	500	825	39,379	42,139	41,450	8,237	128,120	69,995
Santa Clara	*	*	*	*			214,615	225,424	214,615	225,424
Shasta	136,660	166,697			696	855			137,356	167,552
Sonoma	6,396	5,444	*	*	*	*	*	*	6,396	5,444
Siskiyou	18,382	11,020							18,382	11,020
Tehama	2,019	2,835	49	759	1,064	2,362			3,132	5,956
Tulare	19,172	41,470	688	2,436	1,634	2,211	710	710	22,204	46,827
Tuolumne			685	9,116					685	9,116
Ventura	*	*	*	*	67,698	46,605	*	*	67,698	46,605
Amador, Butte, El Dorado, Merced, Napa, Orange, Sacramento, San Benito, San Diego, San Francisco, San Joaquin, Santa Clara, Santa Cruz and Ventura*	1,019,183	486,340							1,019,183	486,340
Butte, Contra Costa, Modoc, Napa, Riverside, San Benito, San Bernardino, San Diego, Santa Clara, Sonoma and Ventura*			264,706	188,350					264,706	188,350
Alameda, El Dorado, Fresno, Kern, Madera, Napa, Orange, Riverside, San Bernardino, San Diego, San Francisco and Sonoma*					220,851	395,638			220,851	395,638
Butte, Contra Costa, El Dorado, Fresno, Kern, Mendocino, Napa, Orange, San Benito, San Diego, Santa Cruz, Solano, Sonoma and Ventura*							629,620	373,891	629,620	373,891
Totals	2,303,507	$1,511,302	390,193	$338,651	613,484	$499,464	2,246,540	$1,644,195	5,553,724	$3,993,609

* Combined to conceal output of individual operators in each.

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Miscellaneous Stone Production of California, by Years.

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893	371,100	$456,075	1915	10,879,497	$4,609,278
1894	661,900	664,838	1916	9,951,089	4,009,590
1895	1,254,688	1,095,939	1917	8,069,271	3,505,662
1896	960,619	839,884	1918	6,641,144	3,325,889
1897	821,123	600,112	1919	6,919,188	3,678,322
1898	1,177,365	814,477	1920	9,792,122	6,782,414
1899	964,898	786,892	1921	10,914,145	7,834,640
1900	789,287	561,642	1922	13,049,644	10,366,231
1901	530,396	641,037	1923	19,840,301	15,379,838
1902	2,056,015	1,249,529	1924	21,451,129	15,962,476
1903	2,215,625	1,673,591	1925	23,819,137	17,407,113
1904	2,296,898	1,641,877	1926	24,987,606	19,859,261
1905	2,624,257	1,716,770	1927	25,126,691	18,912,994
1906	1,555,372	1,418,406	1928	27,471,794	17,328,044
1907	2,288,888	1,915,015	1929	27,104,618	17,840,159
1908	3,998,945	3,241,774	1930	23,514,168	16,430,027
1909	5,531,561	2,708,326	1931	15,848,313	11,848,531
1910	5,827,828	2,777,690	1932	11,361,564	7,183,643
1911	6,487,223	3,610,357	1933	11,181,156	6,871,581
1912	8,044,937	4,532,598			
1913	9,817,616	4,823,056	Totals	357,487,515	$250,866,551
1914	9,288,397	3,960,973			

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business has been coincident with the rapid development of the cement industry from the year 1902.

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CHAPTER FIVE

INDUSTRIAL MATERIALS

Bibliography: State Mineralogist Reports XII–XXX (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have a clearly-defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely-varying amounts of a certain material produced from year to year, but in widely-varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

To the industrial group were added during 1933, carbon dioxide gas, which is now being produced from wells in Imperial County and wollastonite, a mineral from which mineral-wool is made, coming from Kern County. Also fluorspar was again shipped, for the first time since 1918.

This group, as a whole, showed a decrease in total value from $3,820,711 in 1932 to $3,658,249 in 1933.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1932 and 1933:

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Substance	1932		1933		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Barytes	8,507 tons	$49,409	8,405 tons	$49,595	$186+
Bentonite (fuller's earth)	4,295 tons	57,670	4,605 tons	60,621	2,951+
Clay (pottery)	167,284 tons	204,891	141,629 tons	211,711	6,820+
Dolomite	35,275 tons	40,956	54,456 tons	176,575	135,619+
Feldspar	2,294 tons	15,988	*	*	*
Gems		4,961		690	4,271—
Gypsum	46,867 tons	93,818	59,235 tons	120,451	26,633+
Limestone	168,950 tons	487,788	207,371 tons	487,712	76—
Mineral water	19,031,224 gals.	1,495,988	15,650,406 gals.	719,746	776,242—
Pumice and volcanic ash	9,891 tons	86,034	8,243 tons	61,087	24,947—
Silica (quartz and sand)	33,997 tons	136,324	70,329 tons	266,520	130,196+
Soapstone and talc	10,690 tons	122,880	14,451 tons	153,668	30,788+
Unapportioned		[a]1,024,005		[b]1,349,873	325,868+
Total values		$3,820,712		$3,658,249	
Net decrease					$162,463

* Included under "Unapportioned."

[a] Includes asbestos, diatomite, graphite, mica, pyrite, sillimanite-andalusite-cyanite group, sulphur.

[b] Includes carbon dioxide, diatomite, feldspar, fluorspar, graphite, mica, mineral paint, pyrite, sillimanite-andalusite cyanite group, sulphur, wollastonite.

ASBESTOS

Bibliography: State Mineralogist Reports XII–XIX (inc.), XXII, XXVII (inc.), XXIX. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531–533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617–625, 670–677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1933 there was no production of asbestos reported in California. In 1932 there was a small output of chrysotile asbestos mined and shipped for testing. This material came from Napa County. There was no production of this material in 1931. Certain annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887	30	$1,800	1912	90	$2,70
1888	30	1,800	1913	47	1,17
1889	30	1,800	1914	51	1,53
1890	71	4,260	1915	143	2,86
1891	66	3,960	1916	145	2,38
1892	30	1,830	1917	136	10,22
1893	50	2,500	1918	229	9,90
1894	50	2,250	1919	*	
1895	25	1,000	1920	131	6,24
1896			1921	410	19,27
1897			1922	50	1,80
1898	10	200	1923	20	20
1899	30	750	1924	70	4,75
1900	50	1,250	1925	*	
1901	110	4,400	1926	25	1,65
1902			1927	*	
1903			1928	13	1,16
1904	10	162	1929	*	
1905	112	2,625	1930	219	6,17
1906	70	3,500	1931		
1907	70	3,500	1932	*	*
1908	70	6,100	1933		
1909	65	6,500			
1910	200	20,000	Totals	3,083	$142,71
1911	125	500			

* Annual details concealed under 'Unapportioned.'

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BARYTES

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII, XXI–XXVII (inc.). Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319–324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Circ. 6221, 6223.

During 1933 there was a commercial production of crude barytes in California amounting to a total of 8405 short tons valued at $49,595 f.o.b. rail-shipping point, as compared with the 1932 output of 8507 tons worth $49,409. The 1933 output came from Mariposa, Plumas and San Bernardino counties. This material was consumed in the manufacture of lithopone, in heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

The Tariff Act of 1930 placed a duty on foreign imported barytes ore, crude or unmanufactured, of $4 per ton; ground or otherwise manufactured, of $7.50 per ton.

Present quotations for barytes (93% $BaSO_4$) vary from $6 to $7 (Calif. $7) per ton, crude, f.o.b. rail-shipping point. Most baryte has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta and Santa Barbara counties. The deposits at El Portal, in Mariposa County, have given the largest commercial production to date, in part witherite (barium carbonate, $BaCO_3$). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit.

Total Barytes Production of California.

The first recorded production of barytes in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910	860	$5,640	1923	2,925	$16,058
1911	309	2,207	1924	----------	----------
1912	564	2,812	1925	----------	----------
1913	1,600	3,680	1926	4,978	38,165
1914	2,000	3,000	1927	17,993	90,617
1915	410	620	1928	13,406	55,888
1916	1,606	5,516	1929	26,796	168,829
1917	4,420	25,633	1930	19,783	133,107
1918	100	1,500	1931	27,832	156,647
1919	1,501	18,065	1932	8,507	49,409
1920	3,029	20,795	1933	8,405	49,595
1921	901	4,809			
1922	3,370	18,925	Totals	151,295	$871,527

BENTONITE (Fuller's Earth)

Bibliography: State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV–XXVI (inc.). Bulletins 38, 91. U. S. Bureau of Mines, Bulletin 71. Eng. & Min. Jour.-Press, Vol. 121, pp. 837–842, May 22, 1926.

During 1933 there was produced and shipped in California 4605 short tons of bentonite (fuller's earth) valued at $60,621, coming from seven properties, four of which were in San Bernardino County, two

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in Inyo County and one in Kern County. The 1933 output showed an increase, as compared with that of 1932, which was 4295 tons worth $57,670.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is employed in uses that can not be classed as fuller's earth and therefore has been classified in these reports under pottery clay. This made a confusion in classification. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthy, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of $1.50 a ton on foreign produced imported fuller's earth.

Bentonite Production of California by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this state in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899	620	$12,400	1918	37	$333
1900	500	3,750	1919	385	3,810
1901	1,000	19,500	1920	600	6,000
1902	987	19,246	1921	1,185	8,295
1903	250	4,750	1922	6,606	48,756
1904	500	9,500	1923	3,650	55,125
1905	1,344	38,000	1924	5,290	67,295
1906	440	10,500	1925	5,280	91,842
1907	100	1,000	1926	23 552	250,192
1908	50	1,000	1927	13,018	154,764
1909	459	7,385	1928	53 323	501,743
1910	340	3,820	1929	15,541	170,563
1911	466	5,294	1930	12,522	177,964
1912	876	6,500	1931	13,960	222,583
1913	460	3,700	1932	4,295	57,670
1914	760	5,928	1933	4,605	60,621
1915	692	4,002			
1916	110	550	Totals	157,031	$1,372,472
1917	220	2,180			

CARBON DIOXIDE GAS

Bibliography: State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver Mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off. This gas was compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. This material is being com-

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pressed into cylinders and sent to an experimental plant for the manufacture of dry-ice.

Carbon Dioxide Gas Production in California, by Years.

Year	*M cu. ft.*	*Value*
1894	80,000	$4,072
1895	800,000	12,000
1896	81,000	1,300
1897	------	------
1933	*	*
Totals	961,000	$17,372

* Annual details concealed under 'Unapportioned'

CLAY (Pottery)

Bibliography: State Mineralogist Reports I, IV, IX, XII–XV, XVIII–XXVIII (inc.), Bulletins 38, 99. Preliminary Report No. 7. U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-three of its counties. Of these, 17 contributed in 1932. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods, and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.

During 1933 there was a total of 51 properties in 19 counties which reported an output of 141,629 short tons of pottery clay having a total value of $211,711 f.o.b. rail-shipping point for the crude material, as compared with 48 properties in 17 counties, producing 167,284 tons worth $204,890 in 1933.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures, much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data sent in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1933 is shown herewith:

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POTTERY CLAY IN 1933

County	*Tons*	*Value*	*Used in the manufacture of*
Alameda	4,101	$3,946	Architectural terra cotta; chimney, drain and sewer pipe; faience, floor, decorative and roofing tile; garden furniture, refractories and various.
Amador	18,341	26,016	Architectural terra cotta; fire-clay products and refractories; chimney, drain and sewer pipe; floor, mantel and roofing tile; electrical porcelain and various.
Los Angeles	14,145	10,142	Architectural terra cotta; conduit and segment blocks; electrical porcelain and red earthenware; refractories; chimney, drain and sewer pipe; vents; floor, mantel and roofing tile; art pottery and various.
Orange County	13,086	49,762	Stoneware, refractories, vents; drain, floor and mantel tile and various.
Placer County	40,658	59,261	Architectural terra cotta; chimney, drain and sewer pipe; faience, floor, mantel and roofing tile; red earthenware; electrical porcelain, sanitary ware and various.
Riverside County	18,228	32,965	Conduit, sewer and drain pipe; red earthenware; faience, floor, mantel and roofing tile and various.
San Bernardino County	796	5,687	Floor and roofing tile; stoneware, sanitary ware, art pottery, refractories and various.
San Diego	2,896	3,445	Drain, floor and roofing tile; refractories and various.
Santa Clara	1,337	832	Sewer pipe, art pottery; drain, floor, mantel and roofiing tile; stoneware and various.
Calaveras, Contra Costa, Fresno, Imperial, Inyo, Kern,[a] Marin, Monterey, Stanislaus, Ventura[a] *	28,041	19,655	Drain, roofing and mantel tile; saggers; electrical porcelain; refractory, red earthenware, garden furniture, oil-well drilling mud and various.
Totals	141,629	$211,711	

* Combined to conceal the output of a single operator in each.
[a] Includes clay and shale used for oil well drilling mud.

POTTERY CLAY PRODUCTS

The values of the various pottery clay products made in California during 1933 totaled $4,125,651, as compared with $4,858,573 in 1932, their distribution being shown in the following tabulation:

Product	*Number of producers*	*Tons*	*Value*
Architectural terra cotta	6	3,827	$366,957
Chimney pipe and flue lining	8	3,289	99,661
Drain pipe	17	2,589	42,140
Roofing tile	22	26,893	309,002
Electrical porcelain	5	----	393,131
Red earthenware	7	----	83,469
Stoneware and chemical stoneware	5	----	311,208
Sanitary ware and plumbing fixtures	5	----	792,619
Floor, faience, mantel and hand-made tile	31	----	796,260
Conduit pipe	4	2,111	42,901
Ground fire clay and high temperature cement	11	2,815	37,914
Sewer pipe	8	21,153	427,188
Art pottery	5	----	109,953
Miscellaneous: garden furniture, specialties, gas stove radiance, clay shapes, chimney arches, wall coping, terra cotta pipe, red vents, fire tile, gas-house tank blocks, and refractory shapes	15	----	313,248
Total value			$4,125,651

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Important increases were shown by stoneware and chemical stoneware; roofing tile, red earthenware, conduit pipe, and the miscellaneous group. All other groups showed a declined value from their 1932 total.

Pottery Clay Production of California, by Years.

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887	75,000	$37,500	1912	199,605	$215,683
1888	75,000	37,500	1913	231,179	261,273
1889	75,000	37,500	1914	179,948	167,552
1890	100,000	50,000	1915	157,866	133,724
1891	100,000	50,000	1916	134,636	146,538
1892	100,000	50,000	1917	166,298	154,602
1893	24,856	67,284	1918	112,423	166,788
1894	28,475	35,073	1919	135,708	245,019
1895	37,660	39,685	1920	203,997	440,689
1896	41,907	62,900	1921	225,120	362,172
1897	24,592	30,290	1922	277,232	473,184
1898	28,947	33,747	1923	376,863	697,841
1899	40,600	42,700	1924	417,928	651,857
1900	59,636	60,956	1925	537,587	674,376
1901	55,679	39,144	1926	801,461	806,509
1902	67,933	74,163	1927	867,419	872,661
1903	90,972	99,907	1928	887,807	1,394,950
1904	84,149	81,952	1929	839,949	1,127,527
1905	133,805	130,146	1930	938,586	795,517
1906	167,267	162,283	1931	332,680	408,931
1907	160,385	254,454	1932	167,284	204,890
1908	208,042	325,147	1933	141,629	211,711
1909	299,424	465,647			
1910	249,028	324,099	Totals	10,886,138	$13,458,830
1911	224,576	252,759			

DIATOMITE (Diatomaceous Earth)

Bibliography: State Mineralogist Reports II, XII–XV (inc.), XVII–XXVIII (inc.), Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, August, 1915, pp. 1539–1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2431, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152–1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds) and extremely porous, chalk-like materials composed of pure silica (chalk, being calcareous) which have been laid down under water and consist of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The Santa Barbara material is diatomaceous and is of a superior quality, particularly for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Fresno, Kern, Los Angeles, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma, and Tehama counties.

As about 65 per cent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were seven operators during 1933 in Fresno, Los Angeles, Monterey, Santa Barbara, and Stanislaus counties. The shipments during the year showed a slight increase in total tonnage and value compared with 1932.

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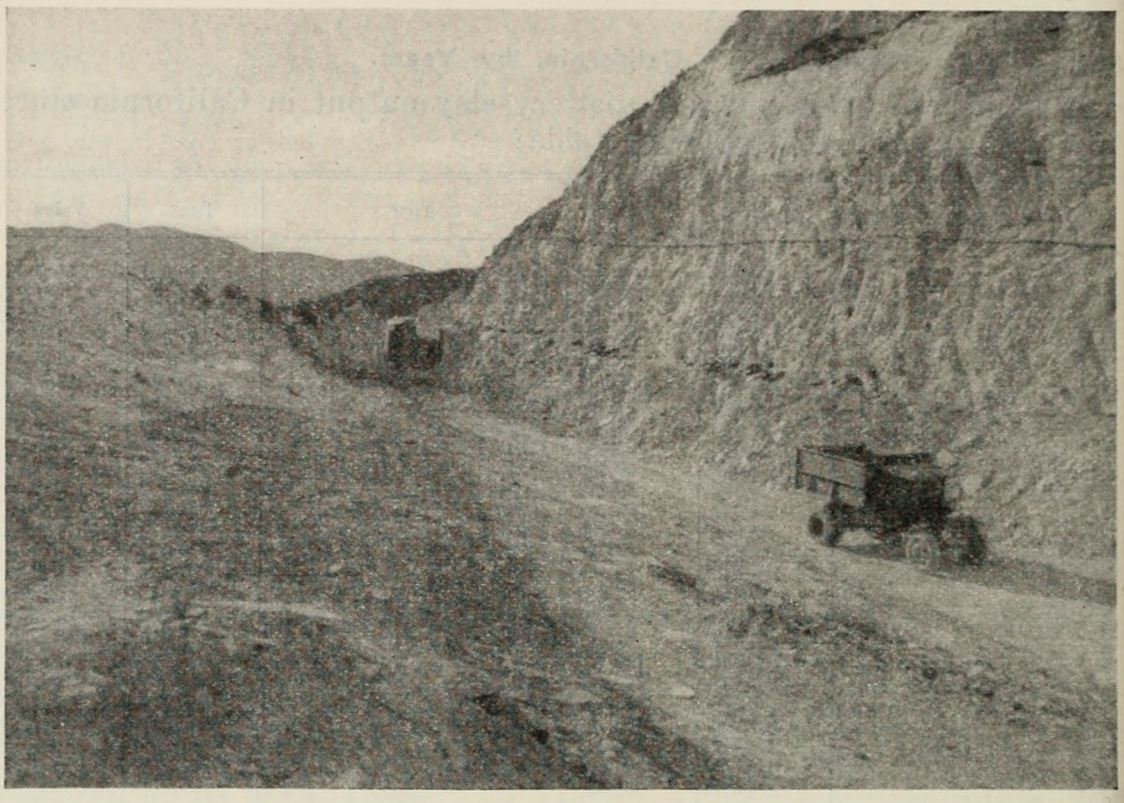
The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.



Diatomite quarry of Johns-Manville Company at Lompoc, Santa Barbara County.

Photo by Walter W. Bradley.

Total Production of Diatomite in California.

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889	39	$1,335	1913	8,645	$35 968
1890			1914	12,840	80,350
1891			1915	12,400	62,000
1892			1916	15,322	80,649
1893	50	2,000	1917	24,301	127,510
1894	51	2,040	1918	35,963	189,459
1895			1919	40,200	217,800
1896			1920	60,764	1,056,260
1897	5	200	1921	*90,739	1,016,675
1898			1922		
1899			1923		
1900			1924	*193,064	5,729,736
1901			1925		
1902	422	2,532	1926		
1903	2,703	16,015	1927	* 275,403	1,995,923
1904	6,950	112,282	1928		
1905	3,000	15,000	1929		
1906	2,430	14,400	1930	*300,017	4,848,661
1907	2,531	28,948	1931		
1908	2,950	32,012	1932	*	*
1909	500	3,500	1933	*	*
1910	1,843	17,617			
1911	2,194	19,670	Totals	1,098,455	$15,723,616
1912	4,129	17,074			

* Annual details concealed under 'Unapportioned.'

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DOLOMITE

Bibliography: State Mineralogist Reports XV, XVII, XXVII, XXVIII.

The production of dolomite in California during 1933 was 54,456 short tons valued at $176,575 and came from three properties in Inyo County and one each in Los Angeles and Monterey counties. The 1933 output was an increase in both amount and value over that of 1932, which was 35,257 tons worth $40,956. The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco, dash-coat, terrazzo, art stone, and for manufacture of CO_2.

Dolomite Production of California, by Years.

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value
1915	4,192	$14,504
1916	13,313	46,566
1917	27,911	66,416
1918	24,560	79,441
1919	24,502	67,953
1920	42,388	132,791
1921	31,195	99,155
1922	52,409	114,911
1923	69,519	142,615
1924	28,843	71,271
1925	42,852	104,900
1926	68,640	119,313
1927	45,976	79,442
1928	38,379	85,342
1929	58,644	156,928
1930 1931 *	66,564	161,245
1932	35,275	40,956
1933	54,456	176,575
Totals	729,618	$1,760,324

* Annual details concealed under 'Unapportioned.'

FELDSPAR

Bibliography: State Mineralogist Reports XV, XVII–XXVIII (inc.). Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Pres, Vol. 115, pp. 535–538, Mar. 24, 1923.

The 1933 feldspar production showed a slight decrease in both amount and value from that of 1932 and is under the 'Unapportioned' item to conceal the output of a single operator in San Diego County. The 1932 yield amounted to 2294 short tons valued at $15,988.

Total Feldspar Production of California.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

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Total Feldspar Production in California

Year	Tons	Value	Year	Tons	Value
1910	760	$5,720	1923	11,100	$81,800
1911	740	4,560	1924	9,055	68,112
1912	1,382	6,180	1925	8,165	59,615
1913	2,129	7,850	1926	7,300	56,400
1914	3,530	16,565	1927	10,932	86,101
1915	1,800	9,000	1928	14,628	93,745
1916	2,630	14,350	1929	13,327	78,404
1917	11,792	46,411	1930	5,014	35,654
1918	4,132	22,061	1931	4,795	59,921
1919	1,272	12,965	1932	2,294	15,988
1920	4,518	26,189	1933	*	*
1921	4,349	28,343			
1922	4,587	37,109	Totals	131,231	$873,038

* Annual details concealed under 'Unapportioned'.

FLUORSPAR

Bibliography: State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489–492, Mar. 22, 1924.

During 1933 in California there was an output of fluorspar coming from San Bernardino County. The annual details are under the 'Unapportioned' item to conceal the output of a single operator. This material was shipped to the steel mills to be used as a flux.

Fluorspar, or calcium fluoride, CaF_2, is one of the most important nonmetallic minerals from an industrial standpoint. About 80 per cent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

The California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917–1918, when a total of 79 tons valued at $991 was shipped from Riverside County.

Present quotations (Metal and Mineral Markets) are: not less than 85 per cent CaF_2 and not over 5 per cent SiO_2, $16 per ton; No. 2 lamp $17.50 per ton.

GEMS

Bibliography: State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI–XXVIII (inc.). Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geol. Univ. of Cal., Vol. 5, pp. 149–153, 331–380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones are gathered and marketed, for the most part in a small way. The gem material reported in California during 1933 had a total value of $690 in the rough. The 1933 output came from Butte, Riverside and Kern counties and consisted of diamonds, rose quartz, and Iceland spar. The above showed a decreased value from the 1932 output, which was worth $4,961.

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Total Production of Gem Materials in California.

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900	$20,500	1918	$650
1901	40,000	1919	5,425
1902	162,100	1920	36,056
1903	110,500	1921	10,954
1904	136,000	1922	1,312
1905	148,500	1923	13,220
1906	497,090	1924	4,800
1907	232,642	1925	10,663
1908	208,950	1926	9,049
1909	193,700	1927	7,035
1910	237,475	1928	22,200
1911	51,824	1929	26,850
1912	23,050	1930	3,540
1913	13,740	1931	5,607
1914	3,970	1932	4,961
1915	3,565	1933	690
1916	4,752		
1917	3,049	Total	$2,254,419

GRAPHITE

Bibliography: State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.). Bulletins 67, 91. U. S. G. S., Min. Res., 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite has been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. During 1931 to 1933 there was a small production of graphite in California from a property in Los Angeles County. The annual details are concealed under 'Unapportioned,' owing to there having been but a single operator.

Graphite Production of California, by Years.

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

Year	*Pounds*	*Value*
1901	128,000	$4,480
1902	84,000	1,680
1903	-------	------
1913	2,500	25
1914	-------	------
1915	-------	------
1916	29,190	2,335
1917, 1918, 1919, 1920	*770,000	37,225
1921, 1922	*624,000	26,160
1923	-------	------
1925, 1926, 1927	*76,000	13,120
1928	-------	------
1931, 1932, 1933*	156,000	1,950
Totals	2,269,690	$86,975

* Annual details concealed under 'Unapportioned,' on account of a single producer.

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GYPSUM

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV–XXVIII (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During the year 1933 there were shipments of gypsum in California amounting to 59,235 short tons valued at $120,451, coming from two properties in Riverside County and a single property each in Fresno, Imperial and Merced counties. This was an increase in both quantity and value from the 1932 output, which was 46,867 tons worth $93,818.

Total Production of Gypsum in California.

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887	2,700	$27,000	1912	37,529	$117,388
1888	2,500	25,000	1913	47,100	135,050
1889	3,000	30,000	1914	29,734	78,375
1890	3,000	30,000	1915	20,200	48,953
1891	2,000	20,000	1916	33,384	59,533
1892	2,000	20,000	1917	30,825	56,840
1893	1,620	14,280	1918	19,695	37,176
1894	2,446	24,584	1919	19,813	50,579
1895	5,158	51,014	1920	20,507	92,535
1896	1,310	12,580	1921	37,412	78,875
1897	2,200	19,250	1922	47,084	188,336
1898	3,100	23,600	1923	86,410	289,136
1899	3,663	14,950	1924	25,569	53,210
1900	2,522	10,088	1925	107,613	172,444
1901	3,875	38,750	1926	114,868	211,337
1902	10,200	53,500	1927	94,630	292,090
1903	6,914	46,441	1928	104,790	200,567
1904	8,350	56,592	1929	140,844	396,951
1905	12,859	54,500	1930	116,865	243,507
1906	21,000	69,000	1931	88,354	199,198
1907	8,900	57,700	1932	46,867	93,818
1908	34,600	155,400	1933	59,235	120,451
1909	30,700	138,176			
1910	45,294	129,152	Totals	1,580,687	$4,439,381
1911	31,457	101,475			

LIMESTONE

Bibliography: State Mineralogist Reports IV, XII–XV (inc.), XVII–XXIX (inc.). Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249–253.

'Industrial' limestone was produced by 20 operators in 10 counties in California during 1933 to the amount of 207,371 short tons valued at $487,712, as compared with the 1932 output, which was 168,950 tons worth $487,788. The 1933 yield came from four properties each in El Dorado and Santa Clara counties, three in Santa Cruz County; two each in San Bernardino and Tuolumne counties; and one each in Alameda, Fresno, Mendocino, San Mateo and Ventura counties.

The amount here given does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as a smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fer-

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tilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno and Ventura counties and one operator in San Bernardino County was marl; and that from Alameda, San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, all of which was ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1933, approximately 78,607 short tons worth $180,422 were used for agricultural purposes and poultry grit.

Distribution of the 1933 output of limestone was as follows:

County	*Tons*	*Value*
El Dorado	120,026	$280,047
San Bernardino	9,836	28,472
Santa Clara [b]	30,646	71,557
Santa Cruz	6,413	22,587
Alameda,[b] Fresno,[a] Mendocino, San Mateo,[b] Tuolumne, and Ventura [a] *	40,450	85,049
	207,371	$487,712

* Combined to conceal the output of individual operators in each.
[a] Includes marl.
[b] Includes shells.

Limestone Production of California, by Years.

The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

Limestone Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1894	15,420	$19,275	1915	146,324	$156,288
1895	71,355	71,690	1916	187,521	217,733
1896	68,184	71,112	1917	237,279	356,396
1897	36,796	38,556	1918	208,566	456,258
1898	27,686	24,548	1919	88,291	248,145
1899	30,769	29,185	1920	90,120	298,197
1900	32,791	31,532	1921	75,921	305,912
1901	76,937	99,445	1922	84,382	282,181
1902	71,422	90,524	1923	143,266	348,464
1903	125,919	163,988	1924	219,476	582,660
1904	40,207	87,207	1925	319,977	494,525
1905	192,749	323,325	1926	108,795	367,501
1906	80,262	162,827	1927	699 790	663,957
1907	230,985	406,041	1928	127,895	397,935
1908	273,890	297,264	1929	168,315	557,617
1909	337,676	419,921	1930	169,477	508,751
1910	684,635	581,208	1931	177,268	560,699
1911	516,398	452,790	1932	168,950	487,788
1912	613,375	570,248	1933	207,371	487,712
1913	301,918	274,455			
1914	572,272	517,713	Totals	8,029,630	$12,500,573

LITHIA

Bibliography: State Mineralogist Reports II, IV, XIV, XXI. Bulletins 38, 67, 91.

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has

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been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929–1933 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia mica total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899	124	$4,600	1920	10,046	$153,502
1900	440	11,000	1921	*1,365	20,781
1901	1,100	27,500	1922		
1902	822	31,880	1923		
1903	700	27,300	1924	109	2,269
1904	641	25,000	1925		
1905	25	276	1926		
1906			1927	*550	13,900
1915	91	1,365	1928		
1916	71	1,065	1929		
1917	880	8,800			
1918	4,111	73,998	Totals	21,875	$417,636
1919	800	14,400			

* Annual details concealed under 'Unapportioned.'

MICA

Bibliography: State Mineralogist Reports II, IV, XXVI–XXVIII (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55–60, Jan 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California. The 1933 output came from a single property in Imperial County. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the operator. This type of material is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow.

Production of mica in California has been as follows:

Year	*Tons*	*Value*
1902	50	$2,500
1903	50	3,800
1904	50	3,000
1929		
1930 *	2,240	15,260
1931		
1932	*	*
1933	*	*
Totals	2,390	$24,560

* Annual details concealed under "Unapportioned."

MINERAL PAINT

Bibliography: State Mineralogist Reports XII–XIX (inc.), XXI, XXII–XXVIII (inc.). Bulletins 38, 91.

During 1933 there was a small amount of mineral paint shipped in California coming from a single property in Alameda County, the details of which are concealed under the 'Unapportioned' item. There was no output in 1932, that being the first year since the production of this material was first reported commercially in 1890 in this State that there were no shipments.

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These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity and Yuba counties, in which they are found.

Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

Year	Tons	Value	Year	Tons	Value
1890	40	$480	1913	303	$1,780
1891	22	880	1914	132	847
1892	25	750	1915	311	1,756
1893	590	26,795	1916	643	3,960
1894	610	14,140	1917	520	2,700
1895	750	8,425	1918	728	4,738
1896	395	5,540	1919	1,780	17,055
1897	578	8,165	1920	779	8,477
1898	653	9,698	1921	446	4,748
1899	1,704	20,294	1922	1,620	13,277
1900	529	3,993	1923	1,049	11,773
1901	325	875	1924	532	5,234
1902	589	1,533	1925	669	6,969
1903	2,370	3,720	1926	569	5,846
1904	270	1,985	1927 *	919	9,592
1905	754	4,025	1928		
1906	250	1,720	1929	467	2,820
1907	250	1,720	1930 *	250	3,000
1908	335	2,250	1931		
1909	305	2,325	1932		
1910	200	2,040	1933	*	*
1911	186	1,184			
1912	300	1,800	Totals	23,147	$222,098

* Annual details concealed under 'Unapportioned.'

MINERAL WATER

Bibliography: State Mineralogist Reports VI, XII–XVIII (inc.), XXI–XXIX (inc.). U. S. G. S., Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

Commercial production of mineral water in California during 1933 amounted to 15,650,406 gallons worth $719,746. This was a decrease in both quantity and value from the 1932 output, which was 19,031,224

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gallons valued at $1,495,988. The 1933 output was distributed as follows:

County	*Gallons*	*Value*
Lake	11,799	$11,177
Los Angeles	6,672,359	335,310
Napa	15,237	9,940
Sonoma	23,016	2,390
Butte, Colusa, Contra Costa, Marin, Orange, Placer, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, and Siskiyou *	8,927,995	360,929
Totals	15,650,406	$719,746

* Combined to conceal output of individual operators in each.

The production above tabulated either came from springs or artesian wells, and was bottled, in part with artificial carbonation, but mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.

Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,[1] and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

Year	Gallons	Value	Year	Gallons	Value
1887	618,162	$144,368	1912	2,497,794	$529,384
1888	1,112,202	252,990	1913	2,350,792	599,748
1889	808,625	252,241	1914	2,443,572	476,169
1890	258,722	89,786	1915	2,274,267	467,738
1891	334,553	139,959	1916	2,273,817	410,112
1892	331,875	162,019	1917	1,942,020	340,566
1893	383,179	90,667	1918	1,808,791	375,650
1894	402,275	184,481	1919	2,233,842	340,117
1895	701,397	291,500	1920	2,391,791	421,643
1896	808,843	337,434	1921	3,446,278	367,476
1897	1,508,192	345,863	1922	4,276,346	486,424
1898	1,429,809	213,817	1923	5,487,276	616,919
1899	1,338,537	406,691	1924	8,159,211	818,726
1900	2,456,115	268,607	1925	12,115,072	1,230,455
1901	1,555,328	559,057	1926	14,074,877	1,171,550
1902	1,701,142	612,477	1927	16 644,423	1,487.183
1903	2,056,340	558,201	1928	25,049.002	1,304,969
1904	2,430,320	496,946	1929	27,032,083	2,040,615
1905	2,194,150	538,700	1930	37,354,111	2,870,663
1906	1,585,690	478,186	1931	26,164,331	1,347,860
1907	2,924,269	544,016	1932	19,031,224	1,495,988
1908	2,789,715	560,507	1933	15,650,406	719,746
1909	2,449,834	465,488			
1910	2,335,259	522,009	Totals	271,853,528	$29,116,364
1911	2,637,669	590,654			

PHOSPHATES

Bibliography: State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite, Li (AlF) PO_4, have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia.

[1] Cronise, T. F., The natural wealth of California, p. 182, 1868.

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PUMICE and VOLCANIC ASH

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII–XXVIII (inc.). Bulletin 38. U. S. Bureau of Mines I. G. 6560. (See 'Tufa.')

The production of pumice and volcanic ash in California during the year 1933 amounted to 8243 short tons valued at $61,067, coming from four properties in Inyo County and one each in Kern, Madera, Mono, Napa, San Bernardino and Siskiyou counties. The 1933 output showed a decrease from that of 1932, which was 9892 tons worth $86,034.

The material from three of the deposits in Inyo County and from Mono, Napa and Siskiyou counties was 3670 tons pumice and was used in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes and for chicken-house litter. The product from one party in Inyo and that from Kern, Madera and San Luis Obispo counties was 4573 tons of volcanic ash or tuff variety and was employed in making soap, cleanser compounds, a large tonnage being utilized as a concrete filler in cement displacement, and in asphalt and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

Pumice Production of California, by Years.

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909	50	$500	1923	2,936	$16,309
1910	----------	----------	1924	4,919	33,404
1911	----------	----------	1925	5,319	32,937
1912	100	2,500	1926	7,170	48,350
1913	3,590	4,500	1927	13,779	168,896
1914	50	1,000	1928	10,440	105,055
1915	380	6,400	1929	10,449	76,123
1916	1,246	18,092	1930	12,947	128,847
1917	525	5,295	1931	11,711	108,130
1918	2,114	28,669	1932	9,891	86,034
1919	2,388	43,657	1933	8,243	61,067
1920	1,537	25,890			
1921	406	6,310	Totals	110,803	$1,012,213
1922	613	4,248			

PYRITES

Bibliography: State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Shipments of pyrite in California during 1932 and 1933 amounted to 72,271 short tons valued at $297,832. The annual details are placed in the 'Unapportioned' item to conceal the output of either operator. The 1933 production showed an increase in both amount and value over that of 1932 or 1931.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been pro-

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duced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

Pyrites Production in California, by Years.

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898	6,000	$30,000	1917	111,325	$323,704
1899	5,400	28,620	1918	128,329	425,012
1900	3,642	21,133	1919	147,024	540,300
1901	4,578	18,429	1920	146,001	530,581
1902	17,525	60,306	1921	110,025	473,735
1903	24,311	94,000	1922	151,381	570,425
1904	15,043	62,992	1923	148,004	555,308
1905	15,503	63,958	1924	124,214	517,835
1906	46,689	145,895	1925	129,500	528,550
1907	82,270	251,774	1926	100,896	466,088
1908	107,081	610,335	1927	130,910	564,823
1909	457,867	1,389,802	1928	90,566	400,627
1910	42,621	179,862	1929	79,169	363,717
1911	54,225	182,954	1930	39,958	194,228
1912	69,872	203,470	1931	25,402	131,174
1913	79,000	218,537	1932*	72,271	297,832
1914	79,267	230,058	1933*		
1915	92 462	293,148			
1916	120,525	372,969	Totals	3,057,856	$11,342,231

* Annual details concealed under 'Unapportioned'.

SHALE OIL

Bibliography: State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210. Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290–292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb., 1925. Min. Congress Jour., Dec., 1924.

Two plants on a more or less experimental scale have operated in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flotation oil in metallurgical work, and part consumed as fuel at the plants. There was no production reported for 1933.

Shale Oil Production of California, by Years

Year	*Barrels*	*Value*
1922* 1923*	4,333	$44,262
1924* 1925*	8,688	55,240
1926* 1927*	8,819	9,998
1928	----	----
Totals	21,840	$109,500

* Annual details concealed under 'Unapportioned.'

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SILICA (Sand and Quartz)

Bibliography: State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX–XXVIII (inc.). Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1933 amounted to 70,329 short tons valued at $266,520 f.o.b. rail-shipping point, and came from two properties each in Contra Costa and Inyo counties and one each in El Dorado, Monterey, Orange, Riverside and San Diego counties. The above was an increase in both amount and value as compared with the 1932 output, which was 33,997 tons worth $136,324. The 1933 output consisted of 68,591 tons of glass sand and 1008 tons of vein and boulder quartz.

The glass sand came from Contra Costa, Monterey, Orange and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County are replacing the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class colorless glass; for such, it must be essentially iron-free. Even a fractional per cent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of $2 per ton.

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Total Silica Production in California.

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899	3,000	$3,500	1917	19,376	$41,166
1900	2,200	2,200	1918	23,257	88,930
1901	5,000	16,250	1919	18,659	101,600
1902	4,500	12,225	1920	25,324	96,793
1903	7,725	7,525	1921	10,569	49,179
1904	10,004	12,276	1922	9,874	31,016
1905	9,257	8,121	1923	7,964	30,420
1906	9,750	13,375	1924	6,808	35,006
1907	11,065	8,178	1925	12,498	96,780
1908	9,255	22,045	1926	30,010	104,317
1909	12,259	25,517	1927	24,636	94,762
1910	19,224	18,265	1928	14,814	66,679
1911	8,620	8,672	1929	18,686	79,210
1912	13,075	15,404	1930	17,802	71,380
1913	18,618	21,899	1931	43,330	182,769
1914	28,538	22,688	1932	33 997	136,324
1915	28,904	34,322	1933	70,329	266,520
1916	20,880	48,908			
			Totals	609,807	$1,863,221

SILLIMANITE-ANDALUSITE-CYANITE GROUP

Bibliography: State Mineralogist Reports XX, XXIII, XXIV, XXVII. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press, Vol. 120, pp. 91–94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates (Al_2SiO_5), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Cyanite is also an aluminum silicate (Al_2SiO_5), of the same chemical composition as andalusite and sillimante, but crystallizing in the triclinic system. A deposit of cyanite is being mined in Imperial County, near Ogilby, and shipments made to a refractory plant in Los Angeles.

Dumortierite, though different somewhat in composition from the above, being a basic aluminum silicate ($HAl_8BSi_3O_{20}$), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

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Total Sillimanite Group Production of California, by Years

Year	Tons	Value
1922 1923 1924 *	4,584	$98,790
1925 1926 *	4,810	203,000
1927 1928 *	4,276	76,000
1929 1930 *	4,359	198,893
1931 1932 *	1,244	21,800
1933	*	*
Totals	19,273	$598,483

* Annual details concealed under 'Unapportioned.'

SOAPSTONE and TALC

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII–XXVII (inc.). Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1933 amounted to 14,451 short tons valued at $153,668. This was an increase in both quantity and value over the 1932 figures, which were 10,690 tons and $122,880. Of the 1933 production 12,704 tons were high-grade talc from Inyo and San Bernardino counties, which material was utilized mainly in toilet powders, paint, paper and rubber manufacture, and some in ceramics. The remainder of 1748 tons was soapstone and came from Butte, El Dorado, and Los Angeles counties.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper, and part also in magnesite cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from Vermont and New York, and of massive soapstone from Virginia.

During 1933 imports of talc, steatite, etc., totaled 21,946 short tons valued at $383,951, as compared with 19,978 tons worth $357,109 during 1932, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on talc, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

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Talc Production of California, by Years.

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893	400	$17,750	1915	1,663	$14,750
1894			1916	1,703	9,831
1895	25	375	1917	5,267	45,279
1896			1918	11,760	85,534
1897			1919	8,764	115,091
1898			1920	11,327	221,362
1899			1921	8,752	130,078
1900			1922	13,378	197,186
1901	10	119	1923	17,439	252,661
1902	14	288	1924	16,179	242,770
1903	219	10,124	1925	15,465	239,084
1904	228	2,315	1926	17,004	255,645
1905	300	3,000	1927	16,218	164,744
1906			1928	18,668	251,372
1907			1929	18,676	193,493
1908	3	48	1930	15,861	154,258
1909	33	280	1931	13,472	109,940
1910	740	7,260	1932	10,690	122,880
1911			1933	14,451	153,668
1912	1,750	7,350			
1913	1,350	6,150	Totals	242,809	$3,019,185
1914	1,000	4,500			

STRONTIUM

Bibliography: State Mineralogist Report XXVI, XXVII. Bulletins 67, 91. U. S. G. S., Bull. 540; 660–I.

There has been no production of strontium minerals in California since 1918, though in that year both celestite ($SrSO_4$), and the carbonate, strontianite ($SrCO_3$) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averaging 80% $SrCO_3$ have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value
1916	57	$2,850
1917	3,050	37,000
1918	2,900	33,000
1919		
Totals	6,007	$72,850

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SULPHUR

Bibliography: State Mineralogist Reports IV, XIII, XIV, XXV. Bulletins 38, 67, 91.

During 1932–1933 there were shipments of sulphur in California, coming from Alpine and Inyo counties, which totaled 1991 short tons worth $32,838.

This material was shipped mostly for experimental purposes and tests. The annual details are concealed in the 'Unapportioned' item, so as not to reveal the figures of a single operator. The 1932 production was in excess of the 1929–1931 output, which came from Colusa County, and was utilized in the manufacture of a fertilizer and for dusting for mildew. These were the commercial operations of mining sulphur. The last previous production was in 1923 and 1924 and came from Kern County. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

Total Production of Sulphur in California.

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865–1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

Year	*Tons*	*Value*
1865, 1866, 1867 *	941	$53,500
1868 to 1922	----	------
1923, 1924 *	185	4,071
1925 to 1928	----	------
1929, 1930, 1931 *	265	9,025
1932, 1933 *	1,991	32,838
Totals	3,382	$99,434

* Annual details concealed under 'Unapportioned.'

WOLLASTONITE

Wollastonite is a calcium metasilicate ($CaSiO_3$) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of $4\frac{1}{2}$ to 5 and a specific gravity of about 2.9.

A deposit is being operated by John T. Thorndyke in the Radamacher District in Kern County, and is being shipped from Code's Siding to Los Angeles, where it is being used to manufacture mineral wool. This is being done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. The mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in the proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass. This is the first recorded commercial production of wollastonite in California, and apparently also the first in the United States.

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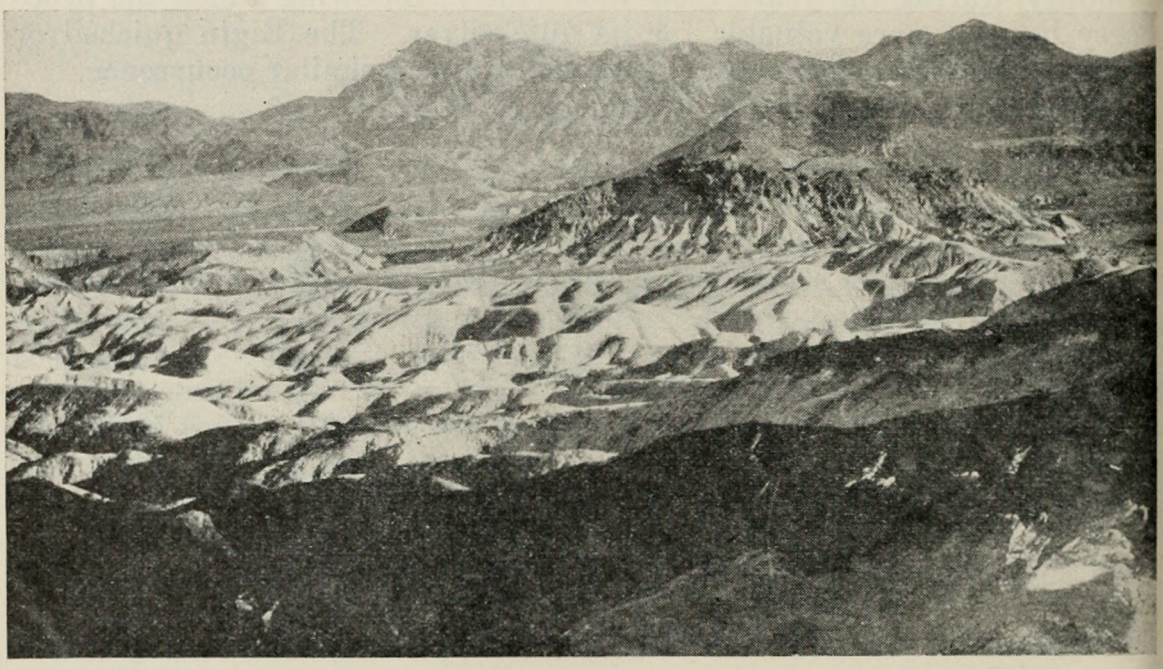
CHAPTER SIX

SALINES

Bibliography: State Mineralogist Reports III, XIV, XV, XVII–XXIX (inc.). Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromide, and in 1931 by iodine. The nitrates are still prospective.



Death Valley, looking north from Furnace Creek Ravine, Inyo County.

Cut by Courtesy of Engineering and Mining Journal.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from $6,135,440 in 1932, to $8,652,224 in 1933. The following table gives details for the years 1932 and 1933:

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Substance	1932		1933		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Borates	179,356 tons	$2,856,470	197,495 tons	$3,019,513	$163,043+
Magnesium salts	*	*	2,073 tons	159,660	* +
Salt	256,353 tons	918,480	321,312 tons	1,251,024	332,544+
Soda	58,017 tons	826,369	70,598 tons	1,019,130	192,761+
Unapportioned		[a]1,534,121		[b]3,202,897	1,668,776+
Total value		$6,135,440		$8,652,224	
Net increase					$2,516,784

* Included under "Unapportioned."
[a] Includes bromine, calcium chloride, magnesium salts, potash.
[b] Includes bromine, calcium chloride, iodine, potash.

BORATES

Bibliography: State Mineralogist Reports III, X, XII–XV (inc.), XVII–XXIX (inc.), XXV–XXVII (inc.). Bulletins 24, 67, 91.

During 1933 there was produced in California a total of 191,006 tons of borate materials, compared with 202,950 tons for the year 1932. The material shipped during the year included the new sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely calcined before shipping to the refinery for conversion into the borax of commerce, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent, A. B. A. This is approximately the average A. B. A. content of the colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1933 production totaled 197,495 short tons valued at $3,019,513. This was an increase both in quantity and value over the 1932 output, which was 179,356 tons worth $2,856,470.

The total amount of borates exported from the United States[1] during the year 1933 was 87,677 tons valued at $2,498,035 as compared with 89,641 tons worth $2,677,626 in 1932.

Total Production of Borate Materials in California.

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864–1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea, to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite

[1] Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1933, Part 1.

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beds at Calico, in San Bernardino County, and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate, near Kramer in Kern County.

The total production of borate materials in California is shown in the following table:

Total Production of Borate Materials in California

Year	Tons	Value	Year	Tons	Value
1864	12	$9,478	1900	25,837	$1,013,251
1865	126	94,099	1901	22,221	982,380
1866	201	132,538	1902	[1]17,202	2,234,994
1867	220	156,137	1903	34,430	661,400
1868	32	22,384	1904	45,647	698,810
1869	----------	----------	1905	46,334	1,019,158
1870	----------	----------	1906	58,173	1,182,410
1871	----------	----------	1907	53,413	1,200,913
1872	140	89,600	1908	22,200	1,117,000
1873	515	255,440	1909	16,628	1,163,960
1874	915	259,427	1910	16,828	1,177,960
1875	1,168	289,080	1911	50,945	1,456,672
1876	1,437	312,537	1912	42,135	1,122,713
1877	993	193,705	1913	58,051	1,491,530
1878	373	66,257	1914	62,500	1,483,500
1879	364	65,443	1915	67,004	1,663,521
1880	609	149,245	1916	103,523	2,409,375
1881	690	189,750	1917	109,944	2,561,958
1882	732	201,300	1918	88,772	1,867,908
1883	900	265,500	1919	66,791	1,717,192
1884	1,019	198,705	1920	127,065	2,794,206
1885	942	155,430	1921	50,136	1,096,326
1886	1,285	173,475	1922	[2]39,087	1,068,025
1887	1,015	116,689	1923	62,667	1,893,798
1888	1,405	196,636	1924	52,070	1,599,149
1889	965	145,473	1925	46,124	1,526,938
1890	3,201	480,152	1926	47,605	1,625,298
1891	4,267	640,000	1927	72,462	3,043,260
1892	5,525	838,787	1928	109,722	3,378,552
1893	3,955	593,292	1929	144,678	3,312,085
1894	5,770	807,807	1930	209,869	3,686,817
1895	5,959	595,900	1931	206,405	5,753,037
1896	6,754	675,400	1932	179,356	2,856,470
1897	8,000	1,080,000	1933	197,495	3,019,513
1898	8 300	1,153,000			
1899	20,357	1,139,882	Totals	2,641,465	$76,622,627

[1] Refined borax. [2] Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County. The 1932 and 1933 outputs and annual details are concealed under the 'Unapportioned' item.

The total commercial production of bromine in California is as follows:

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Year	Tons	Value
1926 1927 * 1928	158	$120,480
1929 1930 * 1931	802	552,933
1932 1933	*	*
Totals	960	$673,413

* Annual details concealed under 'Unapportioned'.

CALCIUM CHLORIDE

Bibliography: U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hydroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1933 the production of calcium chloride in California came from a single plant in San Bernardino County. The annual details are concealed under the 'Unapportioned' item to conceal the output of the operator.

Total Calcium Chloride Production in California.

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value
1921	683	$22,980
1922 * 1923	1,204	26,580
1924 * 1925	10,988	328,876
1926 * 1927	34,195	508,748
1928 * 1929	12,020	114,080
1930 * 1931	9,688	103,237
1932 * 1933	3,103	15,500
Totals	71,881	$1,120,001

* Annual details concealed under 'Unapportioned.'

IODINE

Bibliography: U. S. Bureau of Mines I. C. 6387.

Iodine was first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after

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the armistice the demand for these minerals decreased so that the plants in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. This plant was shut down during 1932, but resumed operation during 1933. In addition to this company's activity, there were two new plants in production. The annual details are concealed under the 'Unapportioned' item, so as not to reveal the output of any of the operators.

The total production of 1929, 1931 and 1933 combined, in California was 696,297 pounds of iodine worth $1,374,311.

MAGNESIUM SALTS

Bibliography: State Mineralogist Reports XX, XXI, XXV–XXVI (inc.). Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1933 there was an output of magnesium salts in California coming from one plant in San Diego County and two in San Mateo County, amounting to 2073 short tons worth $159,660. This was the chloride and the carbonate. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, a bulky white powder, was used as a heat-insulating material, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate marketed was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitterns from the salt plants and was in part marketed in the liquid form carrying from 35 per cent to 67 per cent $MgCl_2$ and in part as dry crystals, while that from San Mateo County was magnesium carbonate.

The average value reported for the chloride produced in California in 1933 was approximately $30 per ton, f.o.b. plant.

Total Production of Magnesium Salts in California.

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' is also made, annually, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

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The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

Year	Tons	Value
1916	851	$6,407
1917	1,064	34,973
1918	1,008	29,955
1919	1,616	82,457
1920	3,150	107,787
1921	4,153	106,140
1922	3,036	89,788
1923	3,662	116,031
1924	4,823	145,883
1925	4,221	132,553
1926	4,881	124,470
1927* 1928*	6,241	139,589
1929* 1930*	4,914	333,906
1931* 1932*	2,749	217,979
1933	2,073	159,660
Totals	48,442	$1,827,578

* Annual details concealed under 'Unapportioned.'

NITRATES

Bibliography: State Mineralogist Reports XV, XXV, XXVI, XXVII. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydro-electric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the power. Sodium and potassium cyanides can be made by fixation of atmospheric nitrogen electrically.

POTASH

Bibliography: State Mineralogist Reports XV, XVIII, XX, XXII, XXV, XXVII (inc.). Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1933 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent K_2O content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts into the United States during 1933, according to the U. S. Bureau of Foreign and Domestic

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Commerce, amounted to 406,015 long tons valued at $9,238,099 compared with 256,230 long tons worth $5,708,588 in 1932. These materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations have recently ranged from $35 per ton c.i.f. Atlantic and Gulf ports for high-grade sulphate (90%–95%), $22.50 per ton for muriate (80%–85%), and $16 for manure salts (30%).

Total Production of Potash in California.

Potash production began commercially in California in 1914, with a small yield from kelp. The bulk of the output comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and value of these potash materials, since their beginning in California in 1914, have been as follows:

Year	*Tons*	*Value*
1914	10	$460
1915	1076	19,391
1916	17,808	663,605
1917	129,022	4,202,889
1918	49,381	6,808,976
1919	28,118	2,415,963
1920	26,298	1,465,463
1921	14,806	390,210
1922	17,776	584,388
1923	29,597	709,836
1924	33,107	747,407
1925	36,355	829,770
1926	32,884	812,285
1927	67,340	1,952,852
1928–1929*	178,680	5,522,350
1930–1931*	172,263	5,500,536
1932–1933*	153,147	3,932,721
Totals	987,768	$36,565,102

* Annual details concealed under 'Unapportioned.'

SALT

Bibliography: State Mineralogist Reports II, XII–XV (inc.), XVII–XXIII (inc.), XXV–XXVII. Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Inyo, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County.

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During 1933 in California there was an output of 321,312 short tons of salt worth $1,251,024, compared with 256,353 tons worth $918,480 in 1932. There were nine plants operating in 1933, two each in Alameda and San Bernardino counties, and one each in Kern, Los Angeles, Modoc, San Diego, and San Mateo counties.

The average value reported for salt produced in California during 1933 was $3.89 per ton f.o.b. plant, as compared with $3.58 in 1932, $3.73 in 1931, $3.36 in 1930, and $6.80 in 1929.

Production of Salt in California, by Years.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887	28,000	$112,000	1911	173,332	$324,255
1888	30,800	92,400	1912	185,721	383,370
1889	21,000	63,000	1913	204,407	462,681
1890	8,729	57,085	1914	223,806	583,553
1891	20,094	90,303	1915	169,028	368,737
1892	23,570	104,788	1916	186,148	455,695
1893	50,500	213,000	1917	227,825	584,373
1894	49,131	140,087	1918	212,076	806,328
1895	53,031	150,576	1919	233,994	896,963
1896	64,743	153,244	1920	230,638	972,648
1897	67,851	157,520	1921	197,989	832,702
1898	93,421	170,855	1922	223,238	819,187
1899	82,654	149,588	1923	275,979	1,130,670
1900	89,338	204,754	1924	318,800	1,159,137
1901	126,218	366,376	1925	284,068	949,826
1902	115,208	205,876	1926	311,761	1,124,978
1903	102,895	211,365	1927	263,028	639,127
1904	95,968	187,300	1928	340,580	1,024,656
1905	77,118	141,925	1929	392,039	2,665,436
1906	101,650	213,228	1930	347,945	1,167,487
1907	88,063	310,967	1931	330,951	1,233,567
1908	121,764	281,469	1932	256,353	918,480
1909	155,680	414,708	1933	321,312	1,251,024
1910	174,920	395,417			
			Totals	7,752,364	$25,342,711

SODA

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXX, XXII, XXIII, XXV–XXIX (inc.). Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1933 included: Soda ash, trona, caustic soda and bicarbonate from plants at Owens Lake, Inyo County, and trona ('sesqui-carbonate,' a double salt of Na_2CO_3 and Na_2CO_3 and $NaHCO_3$) from Searles Lake, San Bernardino County. There were no shipments of salt cake (sulphate) from the Carrizo Plains, San Luis Obispo County. The output of the year amounted to 70,598 short tons valued at $1,019,130, compared with the 1932 figures of 58,017 tons and $826,369.

The dense ash and bicarbonate were used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes.

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Soda Production of California, by Years.

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894	1,530	$20,000	1915	5,799	$83,485
1895	1,900	47,500	1916	10,593	264,825
1896	3,000	65,000	1917	24,505	928,578
1897	5,000	110,000	1918	20,447	855,423
1898	7,000	154,000	1919	21,294	721,958
1899	10,000	250,000	1920	32,407	1,164,898
1900	1,000	50,000	1921	14,828	438,996
1901	8,000	400,000	1922	20,084	573,661
1902	7,000	50,000	1923	34,885	764,284
1903	18,000	27,000	1924	32,536	711,796
1904	12,000	18,000	1925	48,625	947,649
1905	15,000	22,500	1926	63,333	1,305,802
1906	12,000	18,000	1927	62,571	1,478,239
1907	----------	----------	1928	80,838	1,469,297
1908	9,600	14,400	1929	90,646	1,838,657
1909	7,712	11,593	1930	90,122	1,627,344
1910	8,125	11,862	1931	78,701	1,217,811
1911	9,023	52,887	1932	58,017	826,369
1912	7,200	37,094	1933	70,598	1,019,130
1913	1,861	24,936			
1914	6,522	115,396	Totals	1,112,302	$19,738,370

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CHAPTER SEVEN

BY COUNTIES

Introductory.

The State of California includes a total area of 158,297 square miles, of which 155,652 square miles are of land. The maximum width is 235 miles, the minimum 148 miles, and the length from the northwest corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1930 census figures show a total population for California of 5,672,009. Minerals of commercial value exist in every county, and during 1933 some active production was reported to the State Division of Mines from all of the fifty-eight. In 1932, but one county was lacking.

Rank of Counties in Mineral Yield, 1933.

Of the ten leading counties in point of total value of output for 1933, the first five, viz, Los Angeles, Kern, Kings, Orange and Ventura, also Santa Barbara (seventh) and Fresno (ninth) owe their position to petroleum and natural gas. Los Angeles, due to crude oil, leads all other counties. In 1933 it was credited with 30% of the State's total value, having passed Kern in 1923, which led the State for many years. San Bernardino (sixth) owes its position to cement, borates, and potash; Nevada (eighth), and Sacramento (tenth) to gold.

	County	*Value*		*County*	*Value*
1	Los Angeles	$68,785,294	31	Placer	$293,866
2	Kern	27,877,930	32	Tuolumne	264,979
3	Kings	25,474,252	33	San Benito	247,479
4	Orange	19,263,581	34	Napa	209,542
5	Ventura	14,558,096	35	Marin	205,150
6	San Bernardino	8,975,485	36	Tulare	178,613
7	Santa Barbara	7,011,773	37	Imperial	166,858
8	Nevada	4,767,391	38	Modoc	166,747
9	Fresno	3,901,103	39	Sonoma	157,988
10	Sacramento	3,172,763	40	San Joaquin	153,127
11	Riverside	2,218,738	41	Lake	134,851
12	Amador	2,028,598	42	Madera	133,105
13	Alameda	1,930,111	43	Plumas	131,150
14	San Mateo	1,569,480	44	Monterey	114,040
15	Santa Cruz	1,234,180	45	Mono	81,147
16	Contra Costa	1,231,971	46	Humboldt	71,051
17	Yuba	1,150,962	47	San Luis Obispo	55,914
18	Shasta	1,113,395	48	Lassen	45,739
19	Inyo	1,014,713	49	Tehama	30,334
20	Calaveras	938,981	50	Mendocino	35,283
21	El Dorado	920,747	51	Solano	16,996
22	Merced	766,014	52	Yolo	16,823
23	San Diego	620,881	53	Alpine	12,724
24	Mariposa	575,118	54	Sutter	11,900
25	Santa Clara	534,378	55	Glenn	11,690
26	Sierra	449,146	56	Colusa	8,896
27	Butte	404,661	57	San Francisco	7,734
28	Siskiyou	374,178	58	Del Norte	3,062
29	Trinity	359,503			
30	Stanislaus	298,847		Total	$206,489,058

There were nineteen counties, each having a mineral production in excess of a million dollars in 1933. Petroleum was an important item in seven; cement in five; natural gas and gold in four each; miscellaneous stone and borates in two each; potash, soda and diatomite in one each. In point of variety and diversity, San Bernardino County

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led all others in 1933, with a total of twenty-four different mineral products on the commercial list, followed by Inyo and Los Angeles with nineteen each; Kern with eighteen; San Diego with fourteen; Fresno and Riverside with thirteen each; Butte with twelve; El Dorado, Monterey, Orange, Placer and Santa Barbara with eleven each; Amador and Ventura with ten each.

ALAMEDA

Land area: 732 square miles.
Population: 475,153 (1930 census).
Location: East side of San Francisco Bay.
County seat: Oakland.
References: State Mineralogist Report XVII: XVIII: XX: XXVI (Oct. 1929).

Alameda County, while in no sense one of the 'mining counties,' came thirteenth on the list of counties as to value, with a mineral production for 1933 worth $1,930,111, and having nine different substances. This was an increase from the 1932 output, which was valued at $1,765,139.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Brick and hollow building tile	----	$179,152
Clay (pottery)	4,101 tons	3,946
Stone, miscellaneous	----	649,105
Other minerals*	----	1,097,908
Total value		$1,930,111

* Includes lime, limestone (shells) pyrite, salt, and mineral paint.

ALPINE

Land area: 776 square miles.
Population: 236 (1930 census).
Location: On eastern border of State, south of Lake Tahoe.
County seat: Markleeville.
References: State Mineralogist Report XV:XVII:XVIII, XXVII (Oct., 1931).

Alpine County ranked fifty-third in value of output for 1933, which was $12,724, compared with $1,995 in 1932.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	323 lbs.	$21
Gold	----	1,651
Lead	1,169 lbs.	43
Silver	3,118 fine ozs.	1,091
Unapportioned	----	9,918
Total value		$12,724

AMADOR

Land area: 601 square miles.
Population: 8494 (1930 census).
Location: East-central part of State—Mother Lode District.
County seat: Jackson.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXIII (April, 1927).

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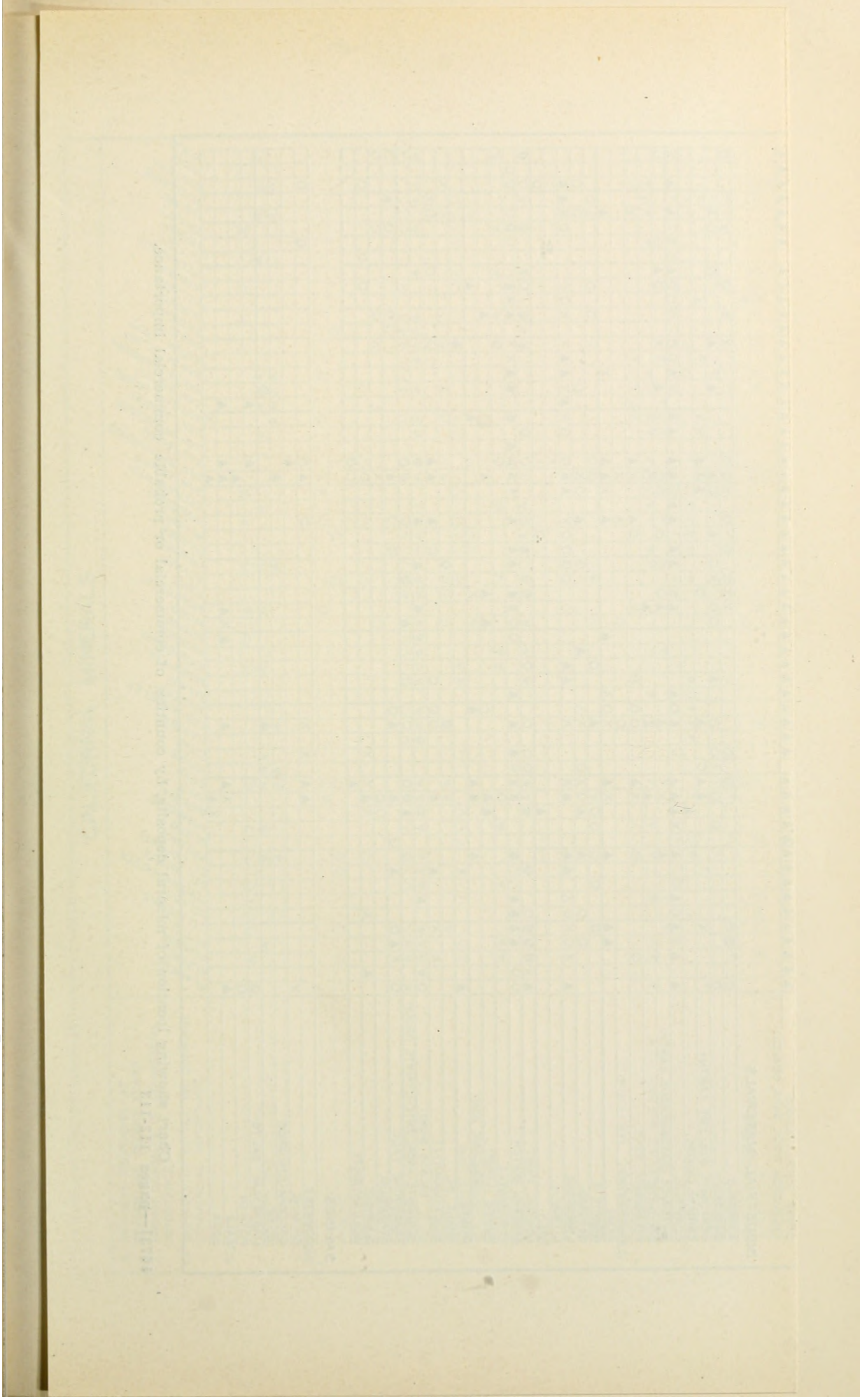

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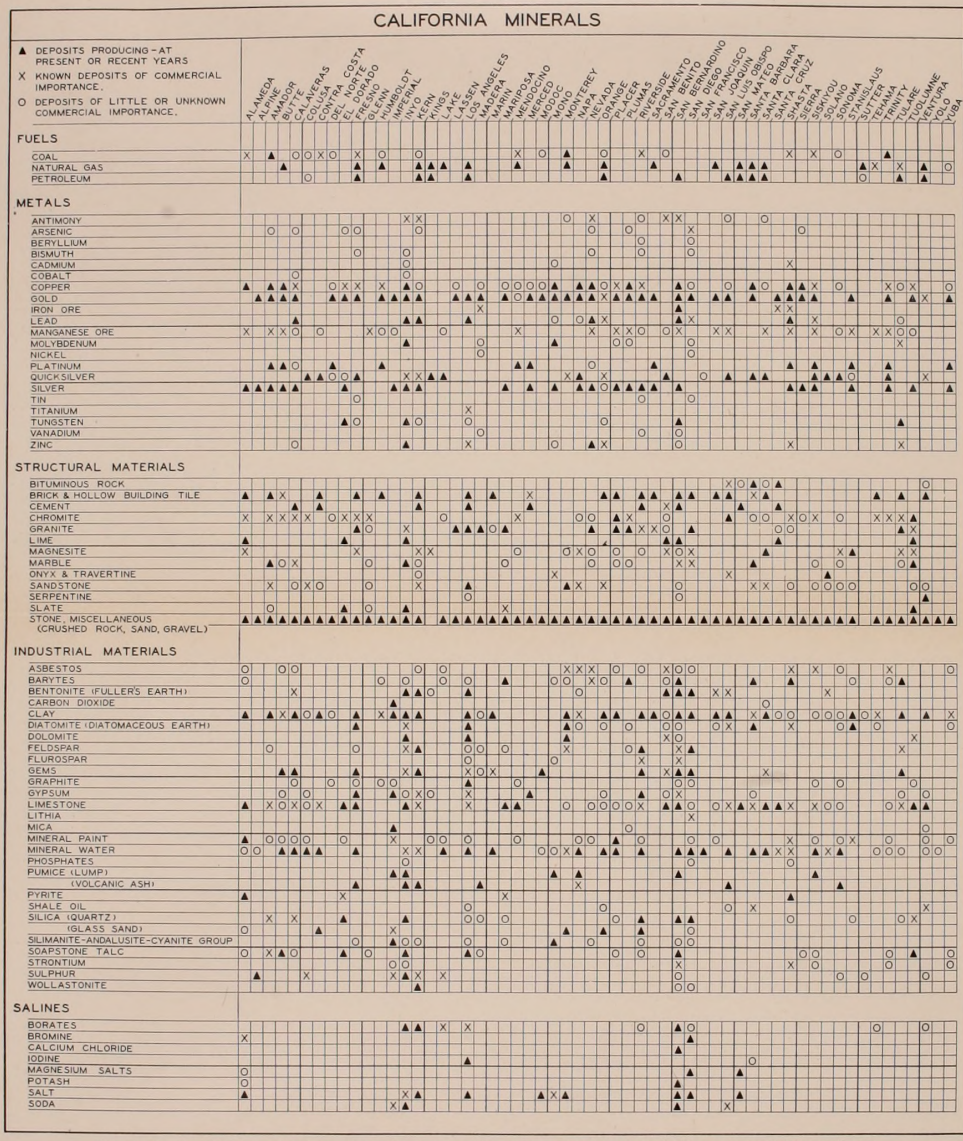

Chart showing location of mineral deposits, by counties, of commercial or probable commercial importance.

16731—pages 112-113

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Amador County ranked twelfth as to value of mineral output for 1933, with ten different minerals worth $2,028,598, compared with $1,400,286 for 1932. The increase was due to gold.

Amador at one time led the State in gold production, though exceeded in 1920–1923 and in 1926–1927 by Yuba and Nevada counties, but in 1925 and 1928 by Yuba only, in 1929–1930 by Nevada only, and in 1931–1933 by Nevada and Sacramento.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	18,341 tons	$26,016
Copper	13,922 lbs.	891
Gold	----	1,945,261
Lead	31,845 lbs.	1,178
Silver	18,489 oz.	6,471
Other minerals*	----	48,781
Total		$2,028,598

* Includes brick, coal, marble, miscellaneous stone.

BUTTE

Land area: 1722 square miles.
Population: 34,010 (1930 census).
Location: North-central portion of state.
County seat: Oroville.
References: State Mineralogist Report XV: XVII: XVIII: XXIV (July, 1928): XXVI (Oct., 1930).

Butte County ranks twenty-seventh in California as regards to value of mineral output in 1933, with eleven mineral substances having a total value of $404,661 as compared with $464,572 in 1932.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	1,133 lbs.	$73
Gold	----	296,159
Silver	2,774 oz.	971
Miscellaneous stone	----	98,992
Unapportioned*	----	8,466
Total		$404,661

* Includes gems (diamonds) lead, mineral water, natural gas, platinum, soapstone.

CALAVERAS

Land area: 1027 square miles.
Population: 6009 (1930 census).
Location: East-central portion of state—Mother Lode District.
County seat: San Andreas.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXI (April, 1925).

Calaveras County ranked twentieth in California in regard to value of mineral output in 1933 with $938,981 value as against $735,199 in 1932. The increase was due to gold.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	2,248 lbs.	$144
Gold	----	442,980
Lead	6,363 lbs.	235
Silver	5,505 fine oz.	1,927
Miscellaneous stone	----	46,436
Unapportioned	----	447,259
Total		$938,981

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Amador at one time led the State in gold production, though exceeded in 1920–1923 and in 1926–1927 by Yuba and Nevada counties, but in 1925 and 1928 by Yuba only, in 1929–1930 by Nevada only, and in 1931–1933 by Nevada and Sacramento.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	18,341 tons	$26,016
Copper	13,922 lbs.	891
Gold	----	1,945,261
Lead	31,845 lbs.	1,178
Silver	18,489 oz.	6,471
Other minerals*	----	48,781
Total		$2,028,598

* Includes brick, coal, marble, miscellaneous stone.

BUTTE

Land area: 1722 square miles.
Population: 34,010 (1930 census).
Location: North-central portion of state.
County seat: Oroville.
References: State Mineralogist Report XV: XVII: XVIII: XXIV (July, 1928): XXVI (Oct., 1930).

Butte County ranks twenty-seventh in California as regards to value of mineral output in 1933, with eleven mineral substances having a total value of $404,661 as compared with $464,572 in 1932.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	1,133 lbs.	$73
Gold	----	296,159
Silver	2,774 oz.	971
Miscellaneous stone	----	98,992
Unapportioned*	----	8,466
Total		$404,661

* Includes gems (diamonds) lead, mineral water, natural gas, platinum, soapstone.

CALAVERAS

Land area: 1027 square miles.
Population: 6009 (1930 census).
Location: East-central portion of state—Mother Lode District.
County seat: San Andreas.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXI (April, 1925).

Calaveras County ranked twentieth in California in regard to value of mineral output in 1933 with $938,981 value as against $735,199 in 1932. The increase was due to gold.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	2,248 lbs.	$144
Gold	----	442,980
Lead	6,363 lbs.	235
Silver	5,505 fine oz.	1,927
Miscellaneous stone	----	46,436
Unapportioned	----	447,259
Total		$938,981

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COLUSA

Land area: 1140 square miles.
Population: 10,257 (1930 census).
Location: Sacramento Valley.
County seat: Colusa.
References: State Mineralogist Report XIV: XVII: XVIII: XXV (April, 1929).

Colusa County ranks fifty-six in regard to the value of mineral output in 1933 with five different mineral substances worth $8,896 as compared with $38,053 in 1932.

Commercial production for 1933 was as follows:

Substance	*Value*
Gold	$57
Other minerals *	8,839
Total	$8,896

* Includes mineral water, petroleum, quicksilver, miscellaneous stone.

CONTRA COSTA

Land area: 714 square miles.
Population: 78,554 (1930 census).
Location: East side of San Francisco Bay.
County seat: Martinez.
References: State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927).

Contra Costa County stands sixteenth on the list in respect to value of mineral output for 1933, with seven different substances worth $1,231,971, as compared with $1,013,993 in 1932.

Commercial production for 1933 was as follows:

Substance	*Value*
Brick and hollow building tile	$268,235
Stone, miscellaneous	322,483
Other minerals*	641,253
Total value	$1,231,971

* Includes cement, clay (pottery), mineral water, glass sand.

DEL NORTE

Land area: 1024 square miles.
Population: 4734 (1930 census).
Location: Extreme northwest corner of state.
References: State Mineralogist Report XIV: XVII: XXI (July, 1925). XXIX (Jan.-April, 1933).

Del Norte County was in fifty-eighth place as a mineral producing county for 1933, with four different substances worth $3,062 as compared with $25,801 in 1932.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$1,933
Silver	9 fine oz.	3
Other minerals*	----	1,126
Total value		$3,062

* Includes platinum and miscellaneous stone.

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EL DORADO

Land area: 1753 square miles.
Population: 8303 (1930 census).
Location: East-central portion of the state, northernmost of the Mother Lode counties.
County seat: Placerville.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XX: XXII (Oct., 1926).

El Dorado County, which contains the location where gold in California was first heralded to the world, comes twenty-first on the list of counties ranked according to value for 1933, with eleven different mineral substances worth $920,747. In addition to the segregated figures here given, a large tonnage of limestone is annually shipped for use in cement manufacture, the value being included in the state's total for cement. The 1932 output was valued at $549,902. Gold accounts for the increase.

Commercial production for 1933 was as follows:

Substance	*Amount*		*Value*
Copper	2,755	lbs	$176
Gold	------		540,939
Limestone	120,026	tons	208,049
Silver	4,165	fine oz.	1,458
Stone, miscellaneous	------		7,551
Other minerals*	------		90,586
Total value			$920,747

* Includes lead, lime, quartz, slate, soapstone.

FRESNO

Land area: 5950 square miles.
Population: 144,369 (1930 census).
Location: South-central portion of state.
County seat: Fresno.
References: State Mineralogist Report XIV: XVII: XVIII: XXV (July, 1929).

Fresno County, ninth in importance as a mineral producer among the counties of California, reports an output for 1933 of thirteen different mineral substances, with a total value of $3,901,103, as compared with the 1932 value of $3,744,391.

Commercial production for 1933 was as follows:

Substance	*Amount*		*Value*
Gold	------		$19,459
Natural gas	18,807,454	M cu. ft.	1,191,237
Petroleum	4,516,246	bbls.	2,586,906
Quicksilver	34	flasks	1,541
Silver	137	fine oz.	48
Stone, miscellaneous	------		59,363
Other minerals*	------		42,549
Total value			$3,901,103

* Includes brick and hollow-building tile, clay (pottery), diatomite, granite, gypsum, limestone.

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GLENN

Land area: 1259 square miles.
Population: 10,935 (1930 census).
Location: West side of Sacramento Valley.
County seat: Willows:
References: State Mineralogist Report XIV: XVII: XVIII.

Glenn County stands fifty-fifth as a mineral producing county of the state for 1933 and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1933 was as follows, being an increase over $8,714 for the previous year:

Substance	*Value*
Stone, miscellaneous	$11,690

HUMBOLDT

Land area: 3634 square miles.
Population: 43,189 (1930 census).
Location: Northwestern portion of state, bordering on Pacific Ocean.
County seat: Eureka.
References: State Mineralogist Report XIV: XVII: XVIII: XXI (July, 1925).

Humboldt County ranks forty-sixth in the value of its mineral output among the counties of the state for 1933 with six different mineral substances valued at $71,051, compared with the 1932 output worth $117,475.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$5,902
Silver	30 fine oz.	11
Stone, miscellaneous	----	65,012
Other minerals*	----	126
Total value		$71,051

* Includes copper and natural gas.

IMPERIAL

Land area: 4089 square miles.
Population: 60,894 (1930 census).
Location: Extreme southeast corner of the state.
County seat: El Centro.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXII (April, 1926).

Imperial County ranked thirty-seventh in total value of mineral output for 1933, with nine different mineral substances valued at $166,858, compared with the 1932 output worth $251,727.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$6,293
Silver	218 fine oz.	76
Stone, miscellaneous	----	86,962
Other minerals*	----	73,527
Total value		$166,858

* Includes carbon dioxide gas, clay (pottery), gypsum, mica, cyanite.

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INYO

Land area: 10,019 square miles.
Population: 6557 (1930 census).
Location: Lies on eastern border of state, north of San Bernardino County.
County seat: Independence.
References: State Mineralogist Report XV:XVII:XVIII:XX:XXII (Oct., 1926), XXVII.

Inyo County mineral output for 1933 reached a total value of $1,014,913, having nineteen different mineral substances and standing nineteenth among the counties of the State as to value of production. The 1932 output was worth $724,023.

Commercial production for 1933 was as follows:

Substance	*Amount*		*Value*
Copper	7,940	lbs.	$508
Dolomite	48,487	tons	164,987
Gold	------		62,312
Lead	601,135	lbs.	22,241
Pumice and volcanic ash	894	tons	4,150
Silver	20,949	fine oz.	7,332
Stone, miscellaneous	------		18,096
Zinc	255,944	lbs.	10,741
Other minerals*	----		724,346
Total value			$1,014,913

* Includes bentonite, borates, clay (pottery), molybdenite, silica (quartz), slate, talc, sulphur, soda, tungsten.

KERN

Land area: 8003 square miles.
Population: 82,219 (1930 census).
Location: South-central portion of state.
County seat: Bakersfield.
References: State Mineralogist Report XIV:XVII:XVIII:XIX:XX:XXV (Jan., 1929), XXIX (July-Oct., 1933.)

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924–1933, for which petroleum is responsible. The 1933 production consisted of eighteen different mineral substances, valued at $27,877,930, compared with the 1932 output worth $28,069,925.

Commercial production for 1933 was as follows:

Substance	*Amount*		*Value*
Gold	------		$424,376
Copper	760	lbs.	49
Natural gas	20,571,398	M cu. ft.	916,090
Petroleum	35,349,272	bbls.	23,521,406
Silver	39,909	fine oz.	13,968
Stone, miscellaneous	------		70,931
Other minerals*	------		2,931,110
Total value			$27,877,930

* Includes bentonite borates, brick, cement, clay (pottery), gems, lead, volcanic ash, quicksilver, salt, wollastonite.

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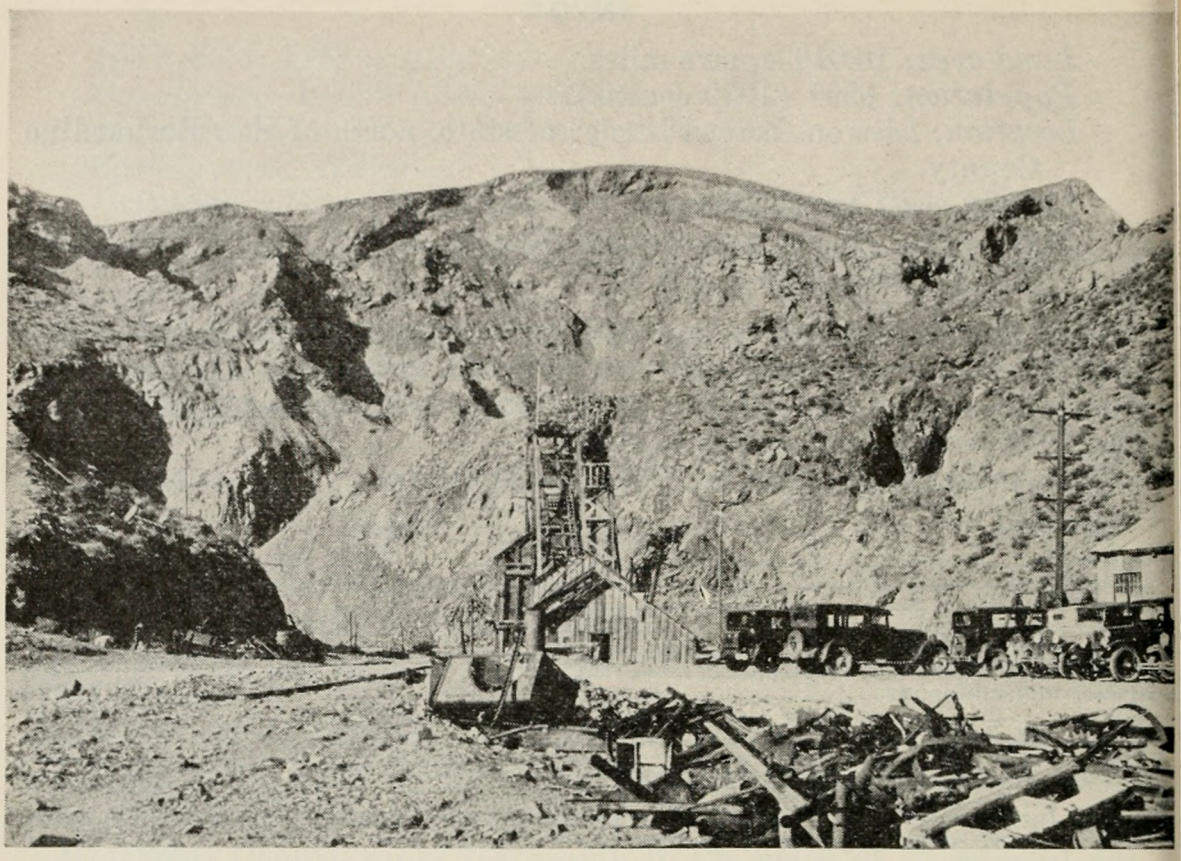

Glory hole at the Rand level of the Yellow Aster Mine, at Randsburg, Kern County.
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KINGS

Land area: 1559 square miles.
Population: 25,277 (1930 census).
Location: South-central portion of the state.
County seat: Hanford.
References: State Mineralogist Report XIV : XVII : XVIII : XXVI (Oct., 1930).

Kings County advanced from ninth position in 1929 to seventh in value of mineral production for 1930, and third for 1931–1933, accounted for by the bringing in of further oil wells at Kettleman Hills, which began commercial yield in 1928.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Natural gas	104,893,813 M cu. ft.	$5,216,344
Petroleum	21,663,622 bbls.	20,253,320
Unapportioned	------	4,588
Total value		$25,474,252

LAKE

Land area: 1278 square miles.
Population: 7166 (1930 census).
Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.
County seat: Lakeport.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929).

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Lake County was in forty-first place as to the value of mineral output for 1933 with five different mineral substances worth $134,851, as compared with $97,084 for 1932.

Substance	*Amount*	*Value*
Mineral water	11,799 gal.	$11,177
Quicksilver	1,610 flasks	90,592
Stone, miscellaneous	----	32,052
Unapportioned	----	30
Total value		$134,851

LASSEN

Land area: 4531 square miles.
Population: 12,587 (1930 census).
Location: Northeast portion of state.
County seat: Susanville.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XXV (Jan., 1929).

Lassen County in forty-eighth place as a mineral producer for 1933 was as follows, being a decrease from $109,568, which was the value for the previous year:

Substance	*Amount*	*Value*
Gold	----	$8,309
Silver	194 fine oz.	68
Stone, miscellaneous	----	35,228
Other minerals *	----	2,094
Total value		$45,739

* Includes copper, granite, lead.

LOS ANGELES

Land area: 4067 square miles.
Population: 2,201,526 (1930 census).
Location: One of the southwestern coast counties.
County seat: Los Angeles.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XX: XXIII (July, 1927).

The mineral production for Los Angeles County for the year 1933 amounted in value to $68,785,294, as compared with the 1932 output worth $76,721,115. This accounted for 30% of the entire state's total for 1933 and ranks Los Angeles first in the state as a mineral producer, having in 1923 passed Kern County, which had been leading for several years previously.

Commercial production for 1933, consisting of nineteen substances, was as follows:

Substance	*Amount*	*Value*
Brick	40,100 M	$639,854
Building tile (hollow)	3,410 tons	19,832
Clay (pottery)	14,195 tons	10,142
Copper	808 lbs.	52
Gold	------	15,861
Lead	2,006 lbs.	74
Mineral water	6,672,359 gal.	335,310
Natural gas	70,490,726 M cu. ft.	4,957,928
Petroleum	67,299,626 bbls.	60,023,645
Sandstone	------	8,725
Silver	337 fine oz.	118
Stone, miscellaneous	------	1,841,946
Other minerals *	------	931,807
Total value		$68,785,294

* Includes cement (see San Bernardino County), diatomite, dolomite, graphite, iodine, salt, soapstone.

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MADERA

Land area: 2112 square miles.
Population: 17,152 (1930 census).
Location: East-central portion of state.
County seat: Madera.
References: State Mineralogist Report XIV : XVII : XVIII : XXIV (Oct., 1928).

Madera County was in forty-second place, as a mineral producer, for 1933, with an output of five different substances valued at $133,105 compared with $298,021 for 1932. The decrease was due to granite.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$8,962
Copper	496 lbs.	32
Lead	5,442 lbs.	210
Silver	2,034 fine oz.	712
Other minerals *	----	123,198
Total value		$133,105

* Includes granite, miscellaneous stone, volcanic ash.

MARIN

Land area: 529 square miles.
Population: 41,635 (1930 census).
Location: Adjoins San Francisco on the north.
County seat: San Rafael.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926).

Marin County in thirty-fifth place as to the value of mineral output for 1933, with five substances, had a commercial production, which was as follows:

Substance	*Value*
Unapportioned *	$205,150

* Includes brick, clay (pottery), mineral water, miscellaneous stone.

MARIPOSA

Land area: 1453 square miles.
Population: 2530 (1930 census).
Location: Most southerly of the Mother Lode counties. East-central portion of State.
County seat: Mariposa.
References: State Mineralogist Report XIV : XVII : XVIII : XIV (April, 1928).

Mariposa County is one of the distinctly "mining" counties of the state, although it stands but twenty-fourth on the list of counties in regard to the value of its mineral output for 1933 with a total of $575,118, as compared with $379,254 for 1932. Mariposa County is also the source of a large tonnage of limestone, annually, which is otherwise credited to cement manufacture in Merced County.

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Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$254,663
Silver	3,177 fine oz.	1,112
Stone, miscellaneous	----	280,016
Other minerals *	----	39,327
Total value		$575,118

* Includes barytes, copper, granite.

MENDOCINO

Land area: 3453 square miles.
Population: 23,491 (1930 census).
Location: Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.
County seat: Ukiah.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX.

Mendocino County's mineral output for 1933 was valued at $35,283, which ranked it as fiftieth among the counties of the State as a mineral producer compared with $101,669 for 1932. Commercial production for 1933 was as follows:

Substance	*Value*
Gold	$155
Stone, miscellaneous	35,010
Other minerals *	118
Total value	$35,283

* Includes limestone and natural gas.

MERCED

Land area: 1995 square miles.
Population: 36,900 (1930 census).
Location: About the geographical center of the state.
County seat: Merced.
References: State Mineralogist Report XIV: XVII: XVIII: XXI (April, 1925).

Merced County ranks twenty-second as to the value of mineral output for 1933, with seven different substances worth $766,014, compared with $749,742 for 1932.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$451,023
Silver	1,744 fine oz.	610
Stone, miscellaneous	----	13,875
Other minerals *	----	300,506
Total value		$766,014

* Includes cement, gypsum, platinum.

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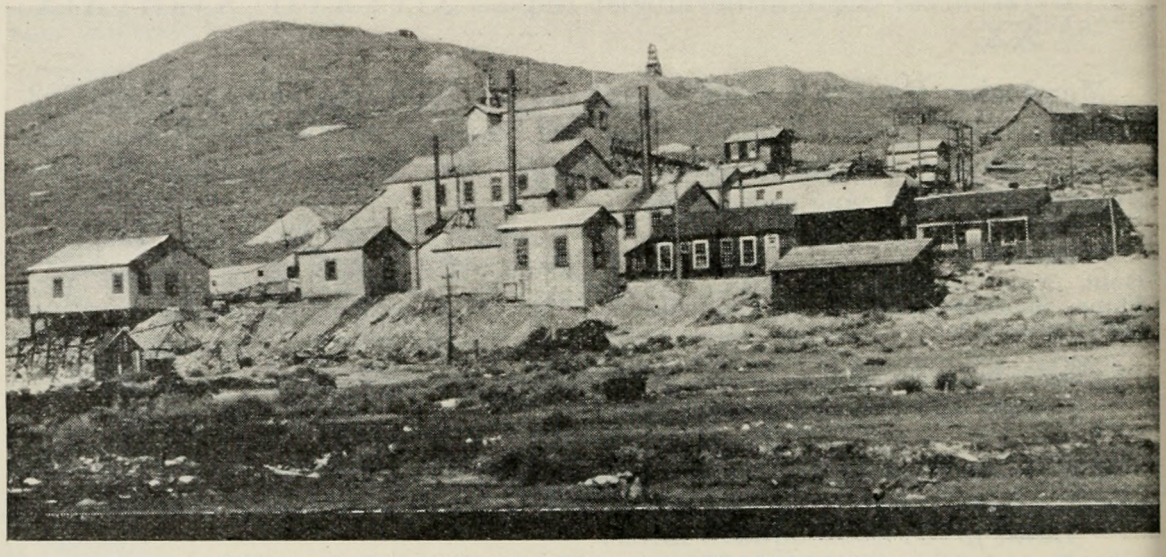
MODOC

Land area: 3823 square miles.
Population: 8038 (1930 census).
Location: The extreme northeast corner of the state.
County seat: Alturas.
References: State Mineralogist Report XV: XVII: XVIII: XXV (Jan., 1929).

Modoc County in thirty-eighth place, with four different substances, reported commercial production for 1933 as follows:

Substance	*Amount*	*Value*
Gold	----	$1,346
Silver	37 fine oz	13
Stone, miscellaneous	----	164,614
Unapportioned	----	774
Total value		$166,747



Standard Consolidated's Mill at Bodie, Mono County.

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MONO

Land area: 3030 square miles.
Population: 1359 (1930 census).
Location: Is bordered by the state of Nevada on the east and is about in the central portion of the state measured on a north and south line.
County seat: Bridgeport.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXIII (Oct., 1927).

Mono County in forty-fifth place with eight different mineral substances, reported commercial production for 1933 as follows:

Substance	*Amount*	*Value*
Copper	665 lbs.	$43
Gold	----	33,378
Lead	5,583 lbs.	170
Silver	2,869 fine oz.	1,004
Stone, miscellaneous	----	20,354
Unapportioned *	----	26,198
Total value		$81,147

* Includes pumice and andalusite.

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MONTEREY

Land area: 3330 square miles.
Population: 53,668 (1930 census).
Location: West-central portion of state, bordering on Pacific Ocean.
County seat: Salinas.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XXI (Jan., 1925).

Monterey County produced eleven different mineral substances during 1933, having a total value of $114,040, as compared with $166,297 for 1932.

In forty-fourth place, commercial production for 1933 was as follows:

Substance	*Value*
Gold	$195
Stone, miscellaneous	64,107
Other minerals *	49,738
Total value	$114,040

* Includes clay (pottery), coal, diatomite, dolomite, natural gas, quicksilver, silica (glass sand).

NAPA

Land area: 783 square miles.
Population: 22,832 (1930 census).
Location: Directly north of San Francisco Bay—one of the 'bay counties.'
County seat: Napa.
References: State Mineralogist Report XIV: XVII: XVIII:XX: XXV (April, 1929).

In 1933 the value of Napa County's mineral output was $209,542, placing it in thirty-fourth place in the list of counties, as compared with $169,633 for 1932.

With five different mineral substances, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Mineral water	15,237 gal.	$9,940
Quicksilver	842 flasks	47,059
Stone, miscellaneous	----	142,143
Other minerals *	----	10,400
Total value		$209,542

* Includes pumice and sandstone.

NEVADA

Land area: 974 square miles.
Population: 10,589 (1930 census).
Location: North of Lake Tahoe, on the eastern border of the state.
County seat: Nevada City.
References: State Mineralogist Report XVI: XVII: XVIII: XIX: XX: XXVI (April, 1930).

Nevada, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918–1921, also 1923. In 1922, 1924, 1929 to 1933, Nevada led all

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counties in gold output, but it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands ninth on the list of counties in regard to value of its mineral output for 1933, with eight substances worth $4,767,391, as compared with $3,704,103 for 1932. The increase was due mainly to advance in the price of gold.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	67,179 lbs.	$4,299
Gold	----	4,676,357
Lead	72,380 lbs.	2,678
Silver	160,311 fine oz.	56,109
Stone, miscellaneous	----	24,400
Zinc	34,478 lbs.	1,448
Unapportioned	----	2,100
Total value		$4,767,391

ORANGE

Land area: 795 square miles.
Population: 118,611 (1930 census).
Location: Southwestern portion of state, bordering Pacific Ocean.
County seat: Santa Ana.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XX: XXI (Jan., 1925).

Orange County in fourth place as to the value of mineral output for 1933, produced eleven mineral substances, worth $19,263,581, as compared with the 1932 output valued at 14,182,245.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	13,486 tons	$49,762
Gold	------	105
Natural gas	13,669,899 M cu. ft.	912,317
Petroleum	22,046,475 bbls.	18,239,049
Silver	2 fine oz.	1
Stone, miscellaneous	------	46,340
Other minerals *	------	16,007
Total value		$19,263,581

* Includes brick, mineral water, quicksilver, silica (glass sand).

PLACER

Land area: 1395 square miles.
Population: 24,442 (1930 census).
Location: Eastern border of state directly west of Lake Tahoe.
County seat: Auburn.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XX: XXIII (July, 1927).

Placer County in thirtieth place, with eleven mineral substances, had a commercial production for 1933 as follows, compared with $240,248 for the previous year:

Substance	*Amount*	*Value*
Clay (pottery)	40,658 tons	$59,261
Gold	----	167,774
Silver	1,357 fine oz.	475
Stone, miscellaneous	----	41,761
Other minerals *	----	24,595
Total value		$293,866

* Includes brick, chromite, copper, granite, lead, mineral water.

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PLUMAS

Land area: 2594 square miles.
Population: 7909 (1930 census).
Location: Northeastern border of state, south of Lassen County.
County seat: Quincy.
References: State Mineralogist Report XVI: XVII: XVIII: XIX: XX: XXIV (Oct., 1928).

Plumas County's mineral output for 1933 with eight different mineral substances was valued at $131,150, as compared with $181,312 for 1932.

In forty-third place, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$70,000
Silver	1,149 fine ozs.	402
Stone, miscellaneous	----	51,125
Other minerals *	----	9,623
Total value		$131,150

* Includes barytes, copper, granite, lead.

RIVERSIDE

Land area: 7240 square miles.
Population: 82,078 (1930 census).
Location: Southern portion of state.
County seat: Riverside.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXV (Oct., 1929).

Riverside is the fourth county in the state in size and the eleventh in regard to the total value of mineral output for 1933. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed thirteen different minerals commercially produced in 1933. The increase in the 1933 output over that of 1932, which was valued at $1,681,855, was due mainly to cement.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	18,228 tons	$32,965
Copper	663 lbs.	42
Gold	----	14,993
Silver	300 fine oz.	105
Stone, miscellaneous	----	237,827
Other minerals *	----	1,932,806
Total value		$2,218,738

* Includes brick and hollow building tile, cement, gems (Iceland spar), gypsum, lead, mineral water, silica (glass sand).

SACRAMENTO

Land area: 983 square miles.
Population: 141,915 (1930 census).
Location: North-central portion of State.
County seat: Sacramento.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXI (Jan., 1925).

Sacramento stands tenth among the counties of the State as a mineral producer, the output, principally gold, for 1933 being valued at

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$3,172,763, as compared with the 1932 production worth $2,339,923. In regard to gold output alone, this country ranks second, being exceeded only by Nevada, the Sacramento product coming from the dredges. With nine mineral substances, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Brick and hollow building tile	----	$75,081
Gold	----	2,996,669
Silver	5,052 fine oz.	1,768
Stone, miscellaneous	----	82,602
Other minerals *	----	16,643
Total value		$3,172,763

* Includes copper, lead, natural gas, platinum.

SAN BENITO

Land area: 1392 square miles.
Population: 11,310 (1930 census).
Location: West-central portion of state.
County seat: Hollister.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXII (April, 1926).

San Benito County ranks thirty-third among the counties in regard to value of total mineral production for 1933, having an output worth $247,479, as compared with $199,924 for the previous year.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Quicksilver	711 flasks	$38,765
Unapportioned	----	208,714
Total value		$247,479

SAN BERNARDINO

Land area: 20,157 square miles.
Population: 133,827 (1930 census).
Location: Southeastern portion of state.
County seat: San Bernardino.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XXVI (July, 1930): XXVII (July, 1931).

San Bernardino, by far the largest county in the State in area, ranks sixth as regards to the value of mineral output for 1933, with a total of $8,975,485, as compared with the 1932 total of $6,043,335.

San Bernardino for several years (except 1918) has led all other counties in the State in point of variety of minerals, producing commercially during 1933 a total of 24 different substances.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Barytes	275 tons	$2,515
Bentonite	1,678 tons	16,042
Clay (pottery)	786 tons	5,687
Copper	7,871 lbs.	504
Gold	------	116,074
Lead	27,936 lbs.	1,034
Silver	96,619 fine oz.	33,817
Talc	8,531 tons	85,262
Stone, miscellaneous	------	145,154
Other minerals *	------	8,569,396
Total value		$8,975,485

* Includes borates, brick, calcium chloride, cement, fluorspar, lime, limestone, mineral water, petroleum, potash, volcanic ash, salt, soda, tungsten.

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SAN DIEGO

Land area: 4221 square miles.
Population: 209,477 (1930 census).
Location: Extreme southwest corner of state.
County seat: San Diego.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXI (July, 1925).

San Diego County ranks twenty-third in the total value of its mineral output for the year with fourteen different minerals on the commercial list. The value for 1933 was $620,881 as compared with the 1932 output worth $375,176, the increase being due mainly to miscellaneous stone.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$5,894
Granite	----	10,097
Silver	68 fine oz.	24
Stone, miscellaneous	----	374,796
Other minerals *	----	230,070
Total value		$620,881

* Includes brick and hollow building tile, bromine, clay (pottery), feldspar, grinding-mill pebbles, magnesium chloride, mineral water, salt, silica (quartz)

SAN FRANCISCO

Land area: 46½ square miles.
Population: 637,212 (1930 census).
County seat: San Francisco.
References: State Mineralogist Report XVII: XVIII: XX: XXV (April, 1929).

Surprising as it may appear at first glance, San Francisco County is listed among the mineral producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel and mineral water.

In fifty-seventh place, commercial production for 1933 was as follows:

Substance	*Value*
Unapportioned *	$7,734

* Includes mineral water and miscellaneous stone.

SAN JOAQUIN

Land area: 1448 square miles.
Population: 102,871 (1930 census).
Location: Central portion of state.
County seat: Stockton.
References: State Mineralogist Report XIV: XVII: XVIII: XXI (April, 1925).

San Joaquin County reported a mineral production for 1933, having a total value of $153,127, as compared with $270,492 for 1932. In fortieth place commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$1,017
Silver	4 fine oz.	1
Stone, miscellaneous	----	49,913
Other minerals *	----	102,196
Total value		$153,127

* Includes brick and hollow building tile, and natural gas.

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SAN LUIS OBISPO

Land area: 3334 square miles.
Population: 29,617 (1930).
Location: Bordered by Kern County on the east and the Pacific Ocean on the west.
County seat: San Luis Obispo.
References: State Mineralogist Report XV: XVII: XVIII: XXI (Oct., 1925).

The total value of the mineral production of San Luis Obispo County in 1933 was $55,914, as compared with the 1932 output worth $249,930. In forty-seventh place, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$759
Quicksilver	285 flasks	15,759
Other minerals *	----	39,396
Total value		$55,914

* Includes brick, chromite, mineral water, petroleum, volcanic ash, miscellaneous stone.

SAN MATEO

Land area: 447 square miles.
Population: 77,338 (1930 census).
Location: Peninsula, adjoined by San Francisco on the north.
County seat: Redwood City.
References: State Mineralogist Report XVII: XVIII: XXV (April, 1929).

San Mateo County had a mineral output in 1933 of eight mineral substances with a total value of $1,569,480, as compared with the 1932 production worth $1,343, 450.

In fourteenth place commercial production for 1933 was as follows:

Substance	*Value*
Stone, miscellaneous	$75,752
Other minerals *	1,493,728
Total value	$1,569,480

* Includes cement, limestone (shells), magnesium carbonate, natural gas, petroleum, salt.

SANTA BARBARA

Land area: 2740 square miles.
Population: 65,075 (1930 census).
Location: Southwestern portion of State, adjoining San Luis Obispo on the south.
County seat: Santa Barbara.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XXI (Oct., 1925).

Santa Barbara County owes its position of seventh in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1933 was $7,011,773, as compared with the 1932 output of $7,583,197.

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With eleven different substances, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	27,998 lbs.	$1,792
Gold	------	27
Natural gas	3,471,759 M cu. ft.	184,609
Petroleum	6,395,679 bbls.	5,999,786
Silver	20 fine oz.	7
Stone miscellaneous	------	38,019
Other minerals *	------	787,533
Total value		$7,011,773

* Includes bituminous rock, diatomite, marble, mineral water, quicksilver.

SANTA CLARA

Land area: 1328 square miles.
Population: 144,921 (1930 census).
Location: West-central portion of state.
County seat: San José.
References: State Mineralogist Report XVII: XVIII: XX: XXVI (Jan., 1930).

Santa Clara County reported a mineral output for 1933 of $534,378 as compared with the 1932 figures of $321,627.

In twenty-fifth place with eight mineral substances, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Brick	6,395 M.	$46,384
Limestone	30,646 tons	71,557
Stone, miscellaneous	----	361,802
Other minerals *	----	54,635
Total value		$534,378

* Includes clay (pottery), magnesite, petroleum, quicksilver.

SANTA CRUZ

Land area: 435 square miles.
Population: 37,405 (1930 census).
Location: Bordering Pacific Ocean, just south of San Mateo County.
County seat: Santa Cruz.
References: State Mineralogist Report XVII: XVIII: XXII (Jan., 1926).

The mineral output of Santa Cruz County, a portion of which is itemized below, amounted to a total of $1,234,180, gives the county a standing of fifteenth among all others in the State in this regard. This was an increase over the 1932 figures of $1,047,766.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$307
Limestone	6,413 tons	22,587
Silver	3 fine oz.	1
Stone, miscellaneous	----	14,120
Other minerals *	----	1,197,165
Total value		$1,234,180

* Includes bituminous rock, cement, lime.

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SHASTA

Land area: 3858 square miles.
Population: 13,925 (1930 census).
Location: North-central portion of state.
County seat: Redding.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XXII (April, 1926), XXIX (Jan., April, 1933).

Shasta County stood eighteenth in California among the mineral producing counties for 1933, with an output valued at $1,113,395, as compared with the 1932 production worth $610,956.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	885,108 lbs.	$54,727
Gold	------	618,290
Lead	14,883 lbs.	551
Silver	19,554 fine oz.	6,884
Miscellaneous stone	------	233,110
Other minerals *	------	199,873
Total value		$1,113,395

* Includes platinum and pyrite.

SIERRA

Land area: 923 square miles.
Population: 2419 (1930 census).
Location: Eastern border of state just north of Nevada County.
County seat: Downieville.
References: State Mineralogist Report XVI: XVII: XVIII: XX: XXV (April, 1929).

Sierra County reported a mineral production of $449,146, which was mainly gold, during the year 1933, as compared with the 1932 output, which was worth $607,872.

In twenty-sixth place, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Copper	599 lbs.	$38
Gold	----	445,102
Silver	3,352 fine oz.	1,173
Miscellaneous stone	----	2,833
Total value		$449,146

SISKIYOU

Land area: 6256 square miles.
Population: 25,505 (1930 census).
Location: Extreme north-central portion of state, next to Oregon boundary.
County seat: Yreka.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXI (Oct., 1925): XXVIII (Jan., 1931).

Siskiyou, fifth county in California in regard to size, located in a highly mineralized and mountainous country, ranks twenty-eighth in regard to the value of its mineral output for 1933. The 1932 production was valued at $184,019.

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Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$324,954
Silver	1,959 fine oz.	686
Stone, miscellaneous	----	29,036
Other minerals *	----	19,502
Total value		$374,178

* Includes copper, lead, mineral water, pumice.

"Mining" gold ore in open-cut with caterpillar bull-dozer, at King Solomon Mine, Siskiyou County.

Photo by Walter W. Bradley.

SOLANO

Land area: 822 square miles.
Population: 40,807 (1930 census).
Location: Touching San Francisco Bay on the northeast.
County seat: Fairfield.
References: State Mineralogist Report XIV: XVII: XVIII: XXIII (April, 1927).

Solano, while mostly valley land, produced mineral substances during the year 1933 to the total value of $16,996, ranking it fifty-first among the counties of the State, compared with the 1932 output worth $36,202.

Commercial production for 1933 was as follows:

Substance	*Value*
Unapportioned *	$16,996

* Includes onyx, travertine, miscellaneous stone.

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SONOMA

Land area: 1577 square miles.
Population: 62,248 (1930 census).
Location: South of Mendocino County, bordering on the Pacific Ocean.
County seat: Santa Rosa.
References: State Mineralogist Report XIV: XVII: XVIII: XXII (July, 1926).

Sonoma County ranks thirty-ninth among the counties of California, during 1933, with a mineral output valued at $157,988, as compared with the 1932 production worth $167,849.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Mineral water	23,016 gal.	$2,390
Stone, miscellaneous	----	147,266
Other minerals *	----	8,332
Total value		$157,988

* Includes granite and quicksilver.

STANISLAUS

Land area: 1450 square miles.
Population: 56,624 (1930 census).
Location: Center of State, bounded on south by Merced County.
County seat: Modesto.
References: State Mineralogist Report XIV: XVII: XVIII: XXI (April, 1925).

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918–1919 by manganese, and in 1921–1923 and 1925–1930 by miscellaneous stone. This county for 1933 ranked thirtieth in the State in regard to minerals, with an output valued at $298,847, as compared with $333,482 in 1932.

Substance	*Amount*	*Value*
Gold	----	$148,204
Silver	689 fine oz.	241
Stone, miscellaneous	----	40,888
Other minerals *	----	109,514
Total value		$298,847

* Includes clay (pottery), diatomite, lead, magnesite.

SUTTER

Land area: 608 square miles.
Population: 14,618 (1930 census).
Location: Bounded by Butte County on the north and Sacramento on the south.
County seat: Yuba City.
References: State Mineralogist Report XV: XVII: XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral substance. In 1917 some crushed rock was taken out, from the Marysville Buttes also in 1925–1928.

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There has been some utilization of natural gas. Both clay and coal exist here, but deposits of neither mineral have been placed on a productive basis. During 1933, there was a mineral output, which was valued at $11,900.

TEHAMA

Land area: 2893 square miles.
Population: 13,839 (1930 census).
Location: North-central portion of the State, bounded on the north by Shasta.
County seat: Red Bluff.
References: State Mineralogist Report XV: XVII: XVIII: XIX: XXIV (July, 1928).

Tehama County stands forty-ninth among the mineral producing counties of the State for 1933, with an output valued at $30,334, as compared with the 1932 yield worth $14,387.

Commercial production, for 1933 was as follows:

Substance	*Value*
Miscellaneous stone	$30,309
Unapportioned	25
Total value	$30,334

TRINITY

Land area: 3166 square miles.
Population: 2811 (1930 census).
Location: Northwestern portion of State.
County seat: Weaverville.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXII (Jan., 1926), XXIX (Jan., April, 1933).

Trinity County's 1933 output of minerals was valued at $359,503, as compared with the 1932 figures of $325,275, mainly due to gold which gives this county the rank of twenty-ninth for the year.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$345,851
Silver	2,194 fine oz.	768
Stone, miscellaneous	----	2,375
Other minerals *	----	10,509
Total value		$359,503

* Includes coal, lead, platinum, quicksilver.

TULARE

Land area: 4856 square miles.
Population: 77,375 (1930 census).
Location: Bounded by Inyo on the east, Kern on the south, Fresno on the north.
County seat: Visalia.
References: State Mineralogist Report XV: XVII: XVIII: XX.

Tulare County stands thirty-sixth on the list of mineral-producing counties for 1933, with eight different substances, having a total value of $178,613, as compared with the 1932 figure of $116,074.

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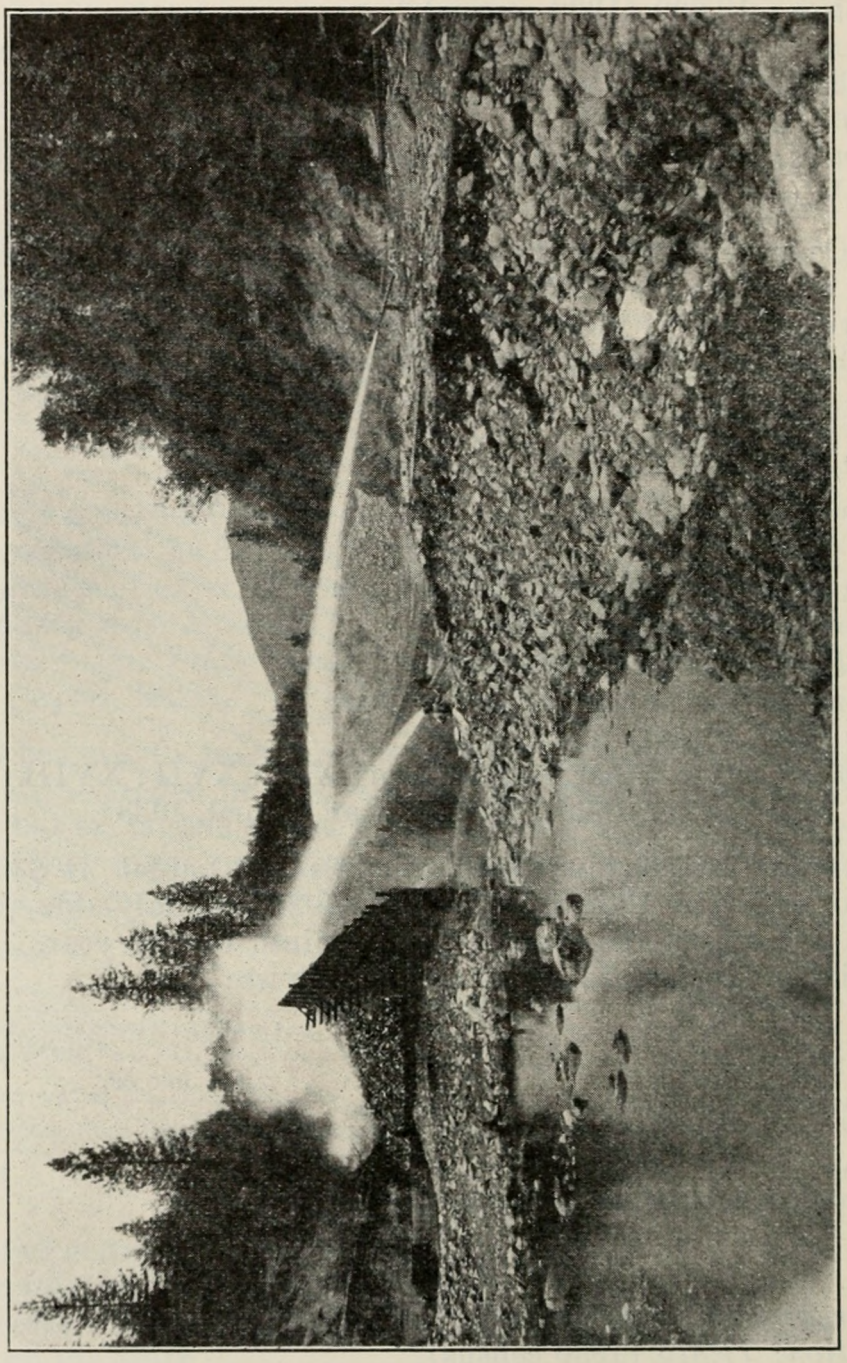

Redding Creek Hydraulic Mine, Douglas City, Trinity County.

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Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$2,152
Silver	40 fine oz.	14
Stone, miscellaneous	----	136,859
Other minerals *	----	39,588
Total value		$178,613

* Includes brick, granite, petroleum, tungsten.

TUOLUMNE

Land area: 2190 square miles.
Population: 9239 (1930 census).
Location: East-central portion of State—Mother Lode District.
County seat: Sonora.
References: State Mineralogist Report XIV: XVII: XVIII: XIX: XX: XXIV (Jan., 1928).

Tuolumne County ranks thirty-second among the counties of the State relative to its total value of mineral output for 1933 with nine different substances. This county ranks first as a producer of marble in the State. The mineral production for 1933 was valued at $264,979, as compared with $300,458 for 1932.

Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$107,736
Silver	800 fine oz.	280
Stone, miscellaneous	----	11,020
Other minerals *	----	145,943
Total value		$264,979

* Includes chromite, lead, lime, limestone, marble, slate.

VENTURA

Land area: 1878 square miles.
Population: 54,577 (1930 census).
Location: Southwestern portion of State, bordering on Pacific Ocean.
County seat: Ventura.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXI: XXVIII (July-Oct., 1932).

Ventura is fifth county in the State in respect to the value of its mineral output for 1933. The 1933 mineral production was worth $14,558,096, as compared with the 1932 output worth $14,855,606.

With eleven different mineral substances, commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	------	$1,193
Lead	1,631 lbs.	64
Natural gas	39,539,382 M cu. ft.	1,957,634
Petroleum	14,793,286 bbls.	12,398,253
Silver	54 fine oz.	19
Stone, miscellaneous	------	164,999
Other minerals *	------	35,534
Total value		$14,558,096

* Includes brick, clay (pottery), granite, limestone (marl).

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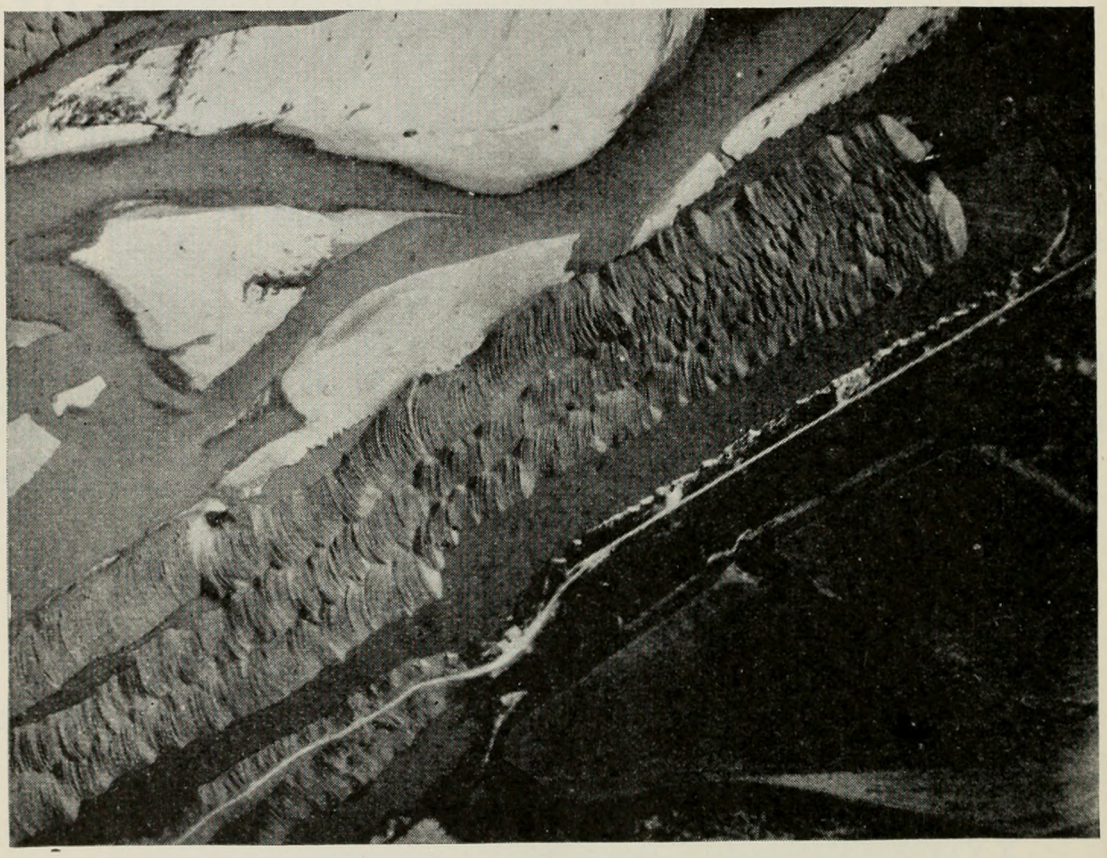
YOLO

Land area: 1017 square miles.
Population: 23,618 (1930 census).
Location: Sacramento Valley, bounded by Sutter on the east and Colusa on the north.
County seat: Woodland.
References: State Mineralogist Report XIV: XVII: XVIII.

Yolo County in fifty-second place had a commercial production for 1933 as follows, compared with $21,625 for the preceding year:

Substance	*Value*
Gold	$129
Miscellaneous stone	16,694
Total value	$16,823



Airplane view of dredging operations along the Yuba River in Yuba County.
Cut by Courtesy of Engineering and Mining Journal.

YUBA

Land area: 639 square miles.
Population: 11,327 (1930 census).
Location: Lies west of Sierra and Nevada counties; south of Plumas.
County seat: Marysville.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXVI (July, 1930).

Yuba County ranks seventeenth among the counties of the State as a mineral producer and fourth in respect to gold, which is obtained mainly by dredgers. The 1932 output was valued at $989,149.

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Commercial production for 1933 was as follows:

Substance	*Amount*	*Value*
Gold	----	$1,117,844
Silver	3,369 fine oz.	1,179
Stone, miscellaneous	----	31,930
Unapportioned	----	9
Total value		$1,150,962

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CHAPTER VIII

DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA, 1933

Note—The producers of natural gas and petroleum will be found in the Quarterly Summary of Operations, California Oil Fields, for July, August and September, 1933 (Vol. 19, No. 2).

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BARYTES

Operator	Address	Location of mine
Mariposa County		
National Pigments Co.	Russ Bldg., San Francisco	El Portal
Plumas County		
Synthetic Iron Color Co.	P. O. Box 1157, Richmond	Almanor
San Bernardino County		
Ralph F. Beegan	281 S. Hudson Ave., Pasadena	Barstow
L. P. Haney	Barstow	Barstow
Pacific Minerals Co., Inc., Chas. S. Renwick	337 Tenth St., Richmond	Barstow

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of mine
Inyo County		
California Desert Products Co.	58 Sutter St., San Francisco	Death Valley Junction
Holmer M. Chase Clay Co.	Olancha	Olancha
Kern County		
Muroc Clay Co.	5525 Randolph St., Maywood	Muroc
San Benito County		
D. L. Stewart Property, A. P. Stewart, lessee	1052 Vermont St., San Jose	Tres Pinos
San Bernardino County		
Walter Becker	P. O. Box 374, Red Mountain	Red Mountain
California Talc Co.	837 Jackson St., Los Angeles	Hector
The Glendinning Co., R. W. Glendinning	1031 S. Broadway, Los Angeles	Searles
J. H. Stone	Barstow	Barstow

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BITUMINOUS ROCK

Operator	Address	Location of mine
Santa Barbara County		
Higgins Quarry, D. A. Sattler, lessee	856 Arguello Rd., Santa Barbara	Carpinteria
Santa Cruz County		
Calrock Asphalt Co.	525 Market St., San Francisco	Majors

BORATES

Operator	Address	Location of mine
Inyo County		
Pacific Alkali Co.	1209 Pacific Mutual Bldg., Los Angeles	Bartlett
Kern County		
Pacific Coast Borax Co.	1014 Central Bldg., Los Angeles	Kramer
Western Borax Co.	566 Subway Terminal Bldg., Los Angeles	Muroc
San Bernardino County		
American Potash and Chemical Corp.	Trona	Trona
West End Chemical Co.	Syndicate Bldg., Oakland	Searles Lake

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BROMINE

Operator	Address	Location of mine
San Diego County		
California Chemical Corp.	Box 8-A, Newark	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
San Bernardino County		
California Rock Salt Co.	2465 Hunter St., Los Angeles	Amboy

CARBON DIOXIDE GAS

Operator	Address	Location of well
Imperial County		
Salton Sea Chemical Co., Carl M. Einhart, Pres.	Niland	Niland

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Operator	Address	Location of mine
Calaveras County		
Calaveras Cement Co.	315 Montgomery St., San Francisco	San Andreas
Contra Costa County		
Henry Cowell Lime and Cement Co.	2 Market St., San Francisco	Cowell
Kern County		
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Monolith
Los Angeles County		
Blue Diamond Corp.	1650 S. Alameda St., Los Angeles	Los Angeles
Merced County		
Yosemite Portland Cement Co.	Merced	Merced
Riverside County		
Riverside Cement Co.	621 S. Hope St., Los Angeles	Riverside
San Bernardino County		
California Portland Cement Co.	1228 Pacific Mutual Bldg., Los Angeles	Colton
Southwestern Portland Cement Co.	503 Roosevelt Bldg., Los Angeles	Victorville
San Mateo County		
Pacific Portland Cement Co.	111 Sutter St., San Francisco	Redwood City
Santa Cruz County		
Santa Cruz Portland Cement Co.	Crocker Bldg., San Francisco	Davenport

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CHROMITE

Operator	Remarks	Address	Location of mine
Placer County			
Danial Sullivan	s	Towle	Dutch Flat
San Luis Obispo County			
Pick & Shovel Mine, P. A. H. Arata	o	San Luis Obispo	Goldtree
Tuolumne County			
McCormick Chrome Mine, Robert McCormick	o	Jamestown	Jamestown

s. Shipped ore, mined prior to 1933. o. Both mined and shipped in 1933.

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(Including producers of crude clay and manufacturers of brick, tile, porcelain, etc.)

10—16731

Operator	Remarks	Address	Location of plant or pit
Alameda County			
California Faience Co.	a	1335 Hearst Ave., Berkeley	Berkeley
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b, c	116 Natomas St., San Francisco	Alameda
Livermore Fire Brick Work and California Brick Plant, W S. Dickey Clay Mfg. Co.	a, b, c	116 New Montgomery St., San Francisco	Livermore and Fabrico
Electrical Porcelain Works	a	2416 6th St., Berkeley	Berkeley
Interlocking Tile Co.	a, c	Niles	Niles
Kraftile Co., L. J. Layton	a	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Muresque Tiles, Inc.	a	503 Merchants Exchange Bldg., San Francisco	Oakland
Remillard Brick Co., R. C. Giroux, Secy.	b	569 3d St., Oakland	Pleasanton
Scott's Corner, M. Lepleux, Mgr.	a, c	Sunol	Sunol
Technical Porcelain and China Ware Co.	a	420 Kains Ave., Albany, via Berkeley, Calif.	Albany
Emeryville Porcelain Works, Westinghouse Elec. and Mfg. Co.	a	61st and Green Sts., Emeryville	Emeryville
Walrich Pottery	a	1285 Hearst Ave., Berkeley	Berkeley
Amador County			
M. J. Bacon	c	Ione	Carbondale
Ione Clay and Sand Pit, Cal. Mineral Products Co.	c, f	Kohl Bldg, San Francisco	Ione
Carlyle Clay Deposits, E. E. Tremain	c	Buena Vista, via R.F.D., Ione	Buena Vista
N. Clark & Sons	c	116 Natoma St., San Francisco	Ione
Ione Clay Pit, W. S. Dickey Clay Mfg. Co.	c	116 New Montgomery St., San Francisco	Ione
Ione Fire Brick Co., J. T. Roberts, Mgr.	b	1267 Russ Bldg., San Francisco	Ione
Newman Clay Co., C. W. Forbes, lessee	c	Ione	Ione
Preston School of Industry	b	Ione	Ione
Calaveras County			
California Pottery Co	c	Niles	Valley Springs
Contra Costa County			
California Art Tile Corp.	a	Box 1116, Richmond	Richmond
Old Mission Tile Co.	a, c	1 20th St., Richmond	San Pablo
Port Costa Brick Works, C. G. Berg, Pres.	b	6th and Berry Sts., San Francisco	Port Costa
Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.	a	Box W, Richmond	Richmond
Stockton Fire Brick Co.	b	Russ Bldg., San Francisco	Pittsburg
United Materials & Richmond Brick Co., Ltd.	a, b, c	P. O. Box 7, Richmond	Richmond
Fresno County			
Craycroft Brick Co	a, b	Griffith-McKenzie Bldg., Fresno	Fresno

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CLAY—Continued

(Including producers of crude clay and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Imperial County			
McKnight Clay Deposit, J. H. McKnight	c	Westminster Hotel, Los Angeles	Glamis
Inyo County			
California Desert Products Co.	e	58 Sutter St., San Francisco	Death Valley
Holmer M. Chase Clay Co.	e	Olancha	Olancha
Kern County			
Bakersfield Rock & Gravel Co.	d	Box 395, St. A, Bakersfield	Bakersfield
Bakersfield Sandstone Brick Co., Jas. Curran, Mgr.	b	Bakersfield	Bakersfield
King Lumber Co.	b	1402 Kings St., Bakersfield	Bakersfield
Muroc Clay Co.	e	5525 Randolph St., Maywood	Muroc
Mojave Rotary Mud Co., Ltd.	d	Box 174, Los Nietos	Muroc
Vitrefrax Co.	c	5050 Pacific Blvd., Los Angeles	Cantil
Los Angeles County			
Alhambra Kilns, Inc., L. C. Merwin	a	Alhambra	Alhambra and Santa Monica
American Refractories Co.	a, b	3232 Alosta St., Los Angeles	Los Angeles
Angulo Tile Plant, R. F. Angulo & Sons	a, c	Reseda	Reseda
Art Tile Co.	a	2304 E. 52d St., Los Angeles	Vernon
Batchelder-Wilson Tile Co.	a	2633 Artesian St., Los Angeles	Los Angeles
J. A. Bauer Pottery Co.	a	415 W. Ave. 33, Los Angeles	Los Angeles
J. Booth	a	7578 Melrose, Los Angeles	Santa Monica
Builders Brick Co., Ltd.	b	177th and Western Aves., Moneta	Moneta
Calco Tile Mfg. Corp.	a	South Gate	South Gate
California Clay Prod. Co., Ltd.	a, c	Box 568, Whittier	Whittier
Claycroft Potteries, Fred H. Robertson	a	3101 San Fernando Blvd., Los Angeles	Los Angeles
Compton Brick and Tile Co.	b	402 Pacific S.W. Bldg., Long Beach	Compton
Consolidated Brick & Tile Co., Ltd	a, b, c	306 Architect Bldg., Los Angeles	Los Angeles, Long Beach, Santa Monica
Coors Co., H. F., Inc.	a	Inglewood	Inglewood
Davidson Brick Co.	b, c	4701 Floral Dr., Los Angeles	Los Angeles
Eljer California Co.	a	4100 Alameda, Los Angeles	Arcadia
Emsco Refractories Co.	a, b	8661 Dorothy Ave., South Gate	South Gate
Tropico, L. A. & S. M. Plants, Gladding, McBean & Co.	a, b, c	660 Market St , San Francisco	Tropico, Los Angeles, Santa Monica Hermosa Beach and Vernon

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Los Angeles County—Continued			
Higgins Brick & Tile Works, James R. Higgins	a, b, c	P. O. Box 1225, Moneta	Moneta
Italian Terra Cotta Co.	a	1149 Mission Rd., Los Angeles	Los Angeles
K. & K Brick Co., Geo. H. Snyder, Pres.	b	606 Union Bank Bldg., Los Angeles	Bishop Canyon
K. & M. Pottery Co.	a	2318 E. 52d St., Los Angeles	Los Angeles
Long Beach Brick Co., Inc., H. A. Havner, Mgr.	b	154 Elm Ave., Long Beach	Long Beach
Markoff Mosaic Tile Corp.	a	1107 E. Redondo Blvd., Inglewood	Inglewood
Pacific Clay Products	a, b, c	650 Chamber of Commerce Bldg., Los Angeles	Los Angeles and Los Nietos
Pomona Brick Co., Wm. McMullen, Mgr.	b	Pomona	Pomona
Pomona Tile Mfg. Co.	a	Pomona	Pomona
San Valle Tile Kilns, R. F Stubver, Mgr.	a, c	6601 Wilbur, Reseda	Reseda
Santa Catalina Island Co., Wm. Wrigley, Jr.	a, b, c	Avalon	Santa Catalina Island
St. Louis Fire Brick and Clay, Joseph Mesmer	a, b	3050 E. Slauson St., Los Angeles	Los Angeles
Simons Brick Co., Walter R. Simons	a, b, c	1195 S. Boyle Ave., Los Angeles	Los Angeles
Standard Brick Co.	b	1760 S. Sato St., Los Angeles	Los Angeles
Star Brick Co.	b	Moneta	Moneta
Tillotson Clay Products	a, b	3363 Fruitland Rd , Vernon	Vernon
Tudor Potteries	a	2406 E. 58th St., Los Angeles	Los Angeles
Vernon Potteries	a	2300 E. 52d St., Los Angeles	Vernon
Vitrefrax Company	a, b	5100 Pacific Ave., Los Angeles	Vernon
West Coast Tile Manufacturers	a, c	2080 E. Slauson Ave., Huntington Park	Huntington Park
Marin County			
McNair Brick Co.	a, b	McNear Point, San Rafael	McNear
Monterey County			
Castroville Clay Products Co.	a, c	Castroville	Castroville
Orange County			
American Fire Clay Co.	c	5050 Pacific Blvd., Vernon	San Juan
Arnold Clay Pit, I. P. Arnold	c	1846 W. 83d St., Los Angeles	El Toro
Gladding, McBean & Co.	c	660 Market St., San Francisco	----------
La Bolsa Tile Co., A N. Griffith	a, b, c	Rt. 1, Box 174, Huntington Beach	Smeltzer
Mission Clay Products Co.	a, b, c	Olive	Olive
Placer County			
Clay Corp. of Cal.	c	1267 Russ Bldg., San Francisco	Lincoln
Gladding, McBean & Co.	a, b, c	5th floor, 660 Market St., San Francisco	Lincoln
Lincoln Clay Products Co., M. J. Dillman, Mgr.	c	Lincoln	Lincoln
Riverside County			
Alberhill Coal and Clay Co.	c	Alberhill	Alberhill
Gladding, McBean & Co.	a, b, c	660 Market St., San Francisco	Alberhill
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Geo. H. Morton	c	Elsinore	Elsinore
Pacific Clay Products	c	650 Chamber of Commerce Bldg , Los Angeles	Corona
Temescal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Temescal

a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil well drilling mud. e. Filtering clay. f. Fire sand.

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CLAY—Continued

(Including producers of crude clay and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Sacramento County			
Cannon & Co.	a, b, c	Box 281, Sacramento	Ben Ali
H. C. Muddox, Jessie E. Muddox, owner	a, b	30th and L Sts., Sacramento	Sacramento
Panama Pottery Co.	a	Box 1478, R.F.D. No. 4, 24th St. Rd., Sacramento	Sacramento
Sacramento Brick Co.	b	1400 Front St., Sacramento	Sacramento
Valley Brick Co.	b	P. O. Box 1180, Sacramento	Sacramento
San Benito County			
D. L. Stewart Property, A. P. Stewart, lessee	e	1052 Vermont St., San Jose	Tres Pinos
San Bernardino County			
Walter Becker	e	P.O. Box 374, Red Mountain	Searles Station
California Talc Co.	c, e	837 Jackson St., Los Angeles	Hector
Hancock Brick Yard, C. P. Hancock & Son	a, b, c	4330 Lemon St., Riverside	Highgrove
Hart Clay Deposit, W. K. S. Keoch, lessee	c	2022 Thayer Ave., Los Angeles	Goffs
Kennedy Clay Pit, John Kennedy	c	1306¾ Warren Ave., Los Angeles	Daggett
Standard Sanitary Mfg. Co., Pacific Mines, P. R. Jones, Mgr.	c	Campo	Hart
J. H. Stone	e	Barstow	Barstow
San Diego County			
Pacific Clay Products Co.	c	650 Chamber of Commerce Bldg., Los Angeles	Farr Station
Union Brick Co., J. W. Rice	b	3565 3d St., North San Diego	Rose Canyon
Vitrified Products Corp.	a, b, c	2841 Jefferson St., North San Diego	North San Diego
San Joaquin County			
San Joaquin Brick Co., J. F. Stein, Secy.	b	33 S. El Dorado St., Stockton	Stockton
Stockton Brick & Tile Co.	b	McKinley Ave., Stockton	Stockton
San Luis Obispo County			
San Luis Brick Works, Faulstich Bros.	a, b	San Luis Obispo	San Luis Obispo
San Mateo County			
Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco

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Santa Clara County			
Coyote Creek Clay Beds, L. R. Lenfest	c	1195 E. Santa Clara St., San Jose	San Jose
Garden City Pottery, N. J. Mahone	a	560 N. 6th St., San Jose	San Jose
Gladding Bros. Mfg. Co.	a, b, c	South 3d and Keyes Sts., San Jose	San Jose
Handcraft Tile Co., L. W. Austin et al	a	Route 2, Box 121A, San Jose	San Jose
Remillard Brick Co.	b	569 3d St., Oakland	San Jose
San Jose Brick Co.	b	P.O. Box 274, San Jose	San Jose
S. & S. Tile Co.	a	1881 S. 1st St., San Jose	San Jose
Stanislaus County			
Coopertown Clay Deposit, J. H. Hornsby	c	651 Cumberland St., Pittsburg	Coopertown
V. J. Winkler	c	Knights Ferry	Knights Ferry
Tulare County			
San Joaquin Materials Co.	b	744 G. St., Fresno	Exeter
Ventura County			
Peoples Lumber Co., C. E. Bonestel, Mgr.	a, b, c	708 E. Meta St., Ventura	Ventura
Dent Clay Pit, Shell Oil Co.	d	Shell Bldg., San Francisco	Ventura

a. Clay products. b. Brick and hollow building tile. c. Crude Clay. d. Oil well drilling mud.

COAL

Operator	Remarks	Address	Location of mine
Amador County			
Buena Vista Coal Mining Co., J. J. Morras, Supt.		Ione, c/o R.F.D.	Buena Vista
Monterey County			
Monterey Coal Corp.		111 Sutter St., San Francisco	Stone Canyon
Trinity County			
Big Bar Coal Mining Co., E. O. E. Klipphahn, Secy.		Route 1, Box 92A, Grass Valley	Big Bar

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COPPER

Principal Copper Producers in California in 1933

Mine	Operator	Address	Location of mine
Amador County			
Pioneer	Pioneer-Lucky Strike Gold Mining Co.	Pine Grove	Pine Grove
Nevada County			
Empress	Empress Gold Mining Co.	Box 914, Grass Valley	Grass Valley
Spanish	Spanish Mining Co.	Crocker Bldg., San Francisco	Washington
Santa Barbara County			
----------	H. M. Roberts	Santa Barbara	--------
Shasta County			
Iron Mountain	The Mountain Copper Co., Ltd.	112 Market St., San Francisco	Matheson

DIATOMITE (DIATOMACEOUS EARTH)

Operator	Remarks	Address	Location of quarry
Fresno County			
Mineral Products Mfg. Co., T. H. Elliott and L. J. Allen	----------	3464 Ventura St., Fresno	Mendota
Los Angeles County			
The Dicalite Co.	----------	756 S. Broadway, Los Angeles	San Pedro
Monterey County			
Pacatome, Ltd.	----------	Bradley	Bradley
Santa Barbara County			
Johns-Manville Products Corp.	----------	Lompoc	Lompoc
National Silica Products Co., C. E. Miller	----------	1201 Bryant St., Palo Alto	Lompoc
The Paraffine Co., Inc.	----------	475 Brannan St., San Francisco	Lompoc
Stanislaus County			
J. H. Hornsby	----------	651 Cumberland St., Pittsburg	Knights Ferry

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DOLOMITE

Operator	Remarks	Address	Location of quarry
Inyo County			
Dolomite Products Co.		103 N. Kingsley Dr., Los Angeles	Lone Pine
Inyo Marble Co.		361 N. Avenue 22, Los Angeles	Lone Pine
Fred Ward & Co.		Box 65, Lone Pine	Keeler
Los Angeles County			
Haskins Dolomite Deposit, J. J. Sherer		5027 60th Pl., Maywood	Maywood
Monterey County			
Pacific Coast Steel Corp., Sterling Ranch Quarry		20th and Illinois Sts., San Francisco	Natividad

FELDSPAR

Operator	Remarks	Address	Location of mine
San Diego County			
Standard Sanitary Mfg. Co., P. R. Jones, Mgr.		Campo	Campo

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FLUORSPAR

Operator	Address	Location of Mine
San Bernardino County		
C. J. Whitlock	987 25th St., San Bernardino	Afton

GEMS

Operator	Variety	Address	Location of mine
Counties, various			
Felker Research Laboratory, Max N. Felker	Rose quartz, blue-agate, myrickite, jasper, bloodstone, chrysoprase, amethyst	3321 Emerald St., Torrance	
Butte County			
———	Diamonds		Cherokee
Riverside County			
Carniger Mine, H. F. Heather	Iceland-spar	236 S. Oak Knoll Ave., Pasadena	Indio

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Principal Gold Producers in California out of a Total of 1790 Operators of Placer and Lode Mines in 1933

Mine	Type of mine	Operator	Address	Location of mine
Amador County				
Amador Star	a	Arthur Hamburger	Plymouth	Plymouth
Argonaut	a	Argonaut Mining Co., Ltd.	Jackson	Jackson
Argonaut Tailing Dump	c	Hill & Hambric	Jackson	Jackson
Central Eureka and Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Pine Grove
Central Eureka Dump	c	Central Tailings Co.	564 Market St., San Francisco	Sutter Creek
Commodore	a	George T. Williams [2]	111 Sutter St., San Francisco	Pine Grove
Fuller Property	a	John J. Bernich	Jackson	Jackson
Kennedy	a	Kennedy Mining and Milling Co.	519 California St., San Francisco	Martell
Lancha Plana	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Pacific	c	Plymouth Con. Mines Co., Ltd., El-Wood, Ore.	Plymouth	Plymouth
Petersen Ranch	a	W. F. Petersen	Jackson	Jackson
Pioneer	a	Pioneer Lucky Strike Gold Mining Co.	Pine Grove	Pine Grove
Valparaiso	d	Valparaiso Mining Co.	Box 414, Jackson	Jackson
Butte County				
Cohan-Gooday	f	Genii Con. Mines Co., Ltd.	Holbrook Bldg., San Francisco	Magalia
New Era	f	Franklin Baldwin	458 S. Spring St., Los Angeles	Oroville
Old Princess	f	Cory Mining Co., Ltd.	381 Bush St., San Francisco	Magalia
Oro Butte	b	Oro Butte Mining Co.	Oroville	Palermo
Shasta-Butte	e	Shasta-Butte Gold Dredging Co.	Box 86, Oroville	Oroville
Surcease	a	Hoefling Bros., Inc.	Chico	Yankee Hill
Calaveras County				
Allen Placer	e	W. F. and Guy Allen	Burson	Burson
Black Wonder	a	Texacala Mining Co.	Westpoint	Westpoint
Calaveras Central	f	Calaveras Central Gold Mining Co., Ltd.	Hobart Bldg., San Francisco	Angels Camp
Carson Hill	a	Carson Hill Gold Mine Corp.	Carson Hill	Carson Hill
Easy Bird	a	Pacific Gold Mining and Milling Co. [3]	212 N. California St., Stockton	Mokelumne Hill
Oro y Plato	c	Union Consolidated Mining Co. [3]	Alexander Bldg., San Francisco	Murphy
Royal	a	F. S. Tower	Milton	Milton
Vallecito-Western	f	Tonopah Belmont Dev. Co.	Angels Camp	Angels Camp

[1] Number does not include snipers, prospectors and various individuals selling small lots to bullion dealers.
[2] Abandoned mine.
[3] Forfeited lease.
a. Lode mine. b. Placer mine. c. Tailing dump. d. Pocket. e. Dredge. f. Drift mine. g. Hydraulic mining.

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GOLD—Continued

Principal Gold Producers in California out of a Total of 1790 Operators of Placer and Lode Mines in 1933

Mine	Type of mine	Operator	Address	Location of mine
El Dorado County				
Beebe	a	The Beebe Gold Mining Co.	Crocker Bldg., San Francisco	Georgetown
Gamhlin	a	Lopez & Gevaggi	Plymouth	Plymouth
Gold Bug	e	Canyon Creek Dredge, J. E. Groudgacer, Trustee	Russ Bldg., San Francisco	Georgetown
Maple Leaf	g	Julia MacDonald	Placerville	Placerville
Montezuma	a	Montezuma-Apex Mining Co.	Box M, Placerville	El Dorado
_____	a	P. H. O'Neil	Placerville	Georgetown
Slate Mountain Group	a	R. W. Brooke	Box 222, Placerville	Georgetown
Sliger	a	Middle Ford Gold Mining Co.	Box M, Auburn	Greenwood
Stuckslager	a	E. J. McKenney	2704 D St., Sacramento	Lotus
Inyo County				
Cleveland	a	Lange Bros.	Big Pine	Big Pine
Jail Canyon	a	Panyo Gold, Ltd.	Stock Exchange Bldg., Los Angeles	Trona
Kern County				
Butte Lode	a	Butte Lode Mining Co. Thomas McNab	Roosevelt Bldg., Los Angeles	Randsburg
Elephant	a	Paul Staples	Mojave	Mojave
King Solomon	a	International Mining and Milling Co.	183 N. Martel St., Los Angeles	Johannesburg
Minnehaha	a	E. E. Maginnis et al.	Box 228, Randsburg	Randsburg
Tropico	a	Burton Bros., Inc. lessees Tropico Mine	Rosemond	Rosemond
Windy Dump	c	Ray E. Peck	Johannesburg	Johannesburg
Yellow Aster	a	Yellow Aster Mining and Milling Co.[6]	Randsburg	Randsburg
Yellow Aster Dump	c	Randsburg-Aster Gold Co.	Johannesburg	Randsburg
Lassen County				
Honey Lake	a	Honey Lake Gold Mining Co.[4]	Doyle	Doyle
Mariposa County				
Diltz	a	E. R. Baker	Mariposa	Whitlock
Feliciana	a	Gold Ledge Mining Co.	Russ Bldg., San Francisco	Midpines
Original	a	Original Mining and Milling Co.	Merced	Incline
Pine Tree and Josephine	a	Pacific Mining Co.	Bear Valley	Bagby
Pyramid	a	Pyramid Leasing Co.	575 W. San Carlos St., San Jose	Hornitos
Texas Hill	a	C. B. Williams	345 E. Santa Clara St., San Jose	Coulterville
Virginia	a	F. L. Morris	Monadnock Bldg., San Francisco	Coulterville

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Merced County				
Merced Unit	e	Yuba Consolidated Goldfields	351 California St., San Francisco	Snelling
Snelling Dredge	e	Snelling Dredging Co.	Snelling	Snelling
————	f	J. H. White [5]	Merced	————
Mono County				
Long Chance	a	H. A. Van Loon	Bishop	Hammel
Standard	a, b	J. S. Cain	Bodie	Bodie
Nevada County				
Canada Hill, Hussey, Queen Lil	a	West Mines Corp.	Nevada City	Nevada City
Empire, North Star, Murchie	a	Empire-Star Mines Co., Ltd.	R. 1507, 14 Wall St., New York, N. Y.	Grass Valley
Empress	a	Empress Gold Mining Co.	Box 914, Grass Valley	Grass Valley
Golden Center	a	Cooley Butler	Rowan Bldg., Los Angeles	Grass Valley
Hoge	a	Great Northern Gold Mines	Nevada City	Nevada City
Idaho Maryland	a	Idaho Maryland Mines Co.	Russ Bldg., San Francisco	Grass Valley
Spanish	a	Spanish Mining Co.	Crocker Bldg, San Francisco	Washington
You Bet	g	You Bet Mining Co.	Grass Valley	You Bet
Sacramento County				
Blue Ravine	f	Gray Wing Extension Mining Co.	1014 First St., Napa, Cal.	Folsom
Capital	e	Capital Dredging Co.	Balfour Bldg., San Francisco	Folsom
Gold Hill	e	Gold Hill Dredging Co.	311 California St., San Francisco	Folsom
Natomas	e	Natomas Co.	Forum Bldg, Sacramento	Natomas
San Bernardino County				
Black Hawk	a	Pittsburg and Mt. Shasta Corp.	Randsburg	Randsburg
Telegraph	a	O. P. Ricker	Nipton	Nipton
Kelly	a	Kelly Gold and Silver Mines, Inc.	Mojave	Randsburg
Old Pete	a	Yim & Wheelock	Box B, Ludlow	Ludlow
Shasta County				
American	a	Westlake-Wheeler and Chenoweth	French Gulch	French Gulch
Iron Mountain	a	The Mountain Copper Co., Ltd.	112 Market St., San Francisco	Matheson
Potosi	a	Gold Standard, A. Herman	Box 160, Redding	Redding
Philadelphia and Roosevelt	a	W. A. Vogt	French Gulch	French Gulch
Russell	b	Western Contracting Co.	Igo	Igo

[4] Defunct.
[5] Deceased
[6] Sold property.
a. Lode mine. b. Placer mine. c. Tailing dump. d. Pocket. e. Dredge. f. Drift mine. g. Hydraulic mining.

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GOLD—Continued

Principal Gold Producers in California out of a Total of 1790 Operators of Placer and Lode Mines in 1933

Mine	Type of mine	Operator	Address	Location of mine
Sierra County				
Depot Hill	g	F. J. Joubert	Camptonville	Camptonville
Loftus	g	Western Precipitation Co.	1016 W. 9th St., Los Angeles	La Porte
Oriental	a	Oriental Gold Star Mines, Inc.	Alleghany	Alleghany
Original 16 to 1	a	Original 16 to 1 Mines, Inc.	Russ Bldg., San Francisco	Alleghany
Sierra Alaska	a	Sierra Alaska Mining Co.	Financial Center Bldg., Oakland	Pike
———	a	L. V. Smith	Alleghany	Alleghany
Siskiyou County				
Cal-Oro	e	Cal-Oro Dredging Co.	Monadnock Bldg., San Francisco	Yreka
King Solomon	a	King Solomon Mines Co.	Crocker Bldg, San Francisco	Black Bear
McConnel Bar	b	W. B. Boulter	Hornbrook	Hornbrook
Mount Vernon	a	Kenneth K. Ash	Box 916, Yreka	Yreka
Stanislaus County				
LaGrange	e	La Grange Gold Dredging Co.	Mills Bldg., San Francisco	La Grange
Trinity County				
Brown Bear	a	Brown Bear Mines Corp.	Lewiston	Lewiston
Buckeye	g	Buckeye Placer Mines, Inc.	Carrville	Carrville
Enterprise	a	Chickson Oil Co., Ltd.	Chapman Bldg., Fullerton	Helena
Gold Bar	e	Gold Bar Dredging Corp.	Lewiston	Lewiston
McAtee Bar	g	Bert Griffith	Denny	Denny
Osborne Hill	g	The M. R. K. Mining Co.	Box 82, Eureka	Helena
Redding Creek Placer	g	Fred C. Wilkins	265 Wawona St., San Francisco	Douglas City
Red Hill	g	Gilzean Bros.	Junction City	Junction City
Trinity	e	Trinity Dredging Co.	Lewiston	Lewiston
Tuolumne County				
Sugarman-Niger	a	Ralph H. Butler	Sonora	Sonora
Yuba County				
Horse Shoe	a	Wallberg Mining Corp.	Challenge	Challenge
Stanfield	e	Norman C. Stines	Russ Bldg., San Francisco	Oregon House
Yuba	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Hammonton

a. Lode mine. b. Placer mine. c. Tailing dump. d. Pocket. e. Dredge. f. Drift mine. g. Hydraulic mining.

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Operator	Product	Address	Location of quarry
Fresno County			
Academy Granite	a	Clovis	Clovis
Superior Granite Co., Inc.	a	Clovis	Academy
Lassen County			
A. D. Greig, Greig Quarry	a	Susanville	Susanville
Madera County			
McGilvray-Raymond Corp.	a	3 Potrero Ave., San Francisco	Raymond
Mariposa County			
Yosemite National Park	a	Yosemite	Yosemite Park
Nevada County			
Netz Granite Quarry, Ludwig Netz	a	Nevada City	Nevada City
Placer County			
Alexson Granite Co.	a	Rocklin	Rocklin
Union Granite Co., Mat Ruhkala	a	Rocklin	Rocklin
Plumas County			
Paul Sonognini	a	Chilcoot	Chilcoot
San Diego County			
American Marble and Granite Works	a	1212 E. 19th St., Los Angeles	Santee
Crystal Black Quarry, John Stridsburg	a	Escondido	Spooks Canyon
Matson & Deering, Meyers Quarry	a	Lakeside	Lakeside
McGilvray-Raymond Corp., Lakeside Quarry	a	678 S. Anderson St., Los Angeles	Lakeside
Southern California Granite Co.	a	3845 Imperial St., San Diego	Lakeside
Sonoma County			
L. R. De Chesne	c	Glen Ellen	Glen Ellen
S. Cabrol	b, c	Glen Ellen	Glen Ellen
Tulare County			
California Quarry, McGilvray-Raymond Corp.	a	3 Potrero Ave., San Francisco	Porterville
Ventura County			
G. W. Dryden	c	Fillmore	Grimes Canyon

a. Granite used in building and monumental stone.
b. Tuff used as building stone.
c. Volcanic rock used as flagstone.

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GRAPHITE

Operator	Address	Location of plant
California Graphite Co., A. R. Plumb	5818 Fayette St., Los Angeles	San Francisquito Canyon

GYPSUM

Operator	Address	Location of quarry
Fresno County		
Paoli Gypsum Mine, A. P. Shepard, Mgr.	3101 Mariposa St., Fresno	Mendota
Imperial County		
Imperial Gypsum Quarry, Pac. Portland Cement	111 Sutter St., San Francisco	Plaster City
Merced County		
O. L. Divens and A. A. Conrowe	Dos Palos	Dos Palos
Riverside County		
E. R. Nonhoff	1116 Ramona St., Corona	Corona
U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland

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IODINE

Operator	Address	Mine
Los Angeles County		
General Salt Co.	P. O. Box 277, Long Beach	Long Beach
Deepwater Chemical Co., Ltd.	Box 762, Compton	Compton
I. O. Dow Chemical Co.	310 Santiago Ave., Long Beach	Long Beach

LEAD

Principal Lead Producers in California in 1933

Mine	Operator	Address	Location of mine
Amador County			
Pioneer	Pioneer-Lucky Strike Gold Mining Co.	Pine Grove	Pine Grove
Inyo County			
Carbonate	J. P. Madison	Shoshone	Shoshone
Cerro Gordo	Estelle Mines Corp.	972 S. Fourth Ave., Los Angeles	Keeler
Santa Rosa	Santa Rosa Mining and Development Co.	Keeler	Keeler
Nevada County			
Empress	Empress Gold Mining Co.	Box 914, Grass Valley	Grass Valley
Shasta County			
Iron Mountain	The Mountain Copper Co., Ltd.	112 Market St., San Francisco	Matheson

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LIME AND LIMESTONE

Operator	Product	Address	Location of quarry
Alameda County			
California Chemical Corp.	a, d	Box 8-A, Newark	Newark
El Dorado County			
Auburn Chemical Lime Co., Ltd.	a, b, c	Auburn	Newcastle
Diamond Springs Lime Co.	a, b	Diamond Springs	Diamond Springs
El Dorado Limestone Co., J. H. Bell, Mgr.	b	Shingle Springs	Shingle Springs
Pac. Portland Cement Co., Cons.	b	111 Sutter St., San Francisco	Auburn
Fresno County			
Coral Reef Lime Corp., B. F. Mason, Mgr.	c, e	Dinuba	Reedley
Mendocino County			
Northwest Pacific Lime & Sulphur Co., John Freitas	b, c	Ukiah	Laughlin
San Bernardino County			
Cal. Portland Cement Co.	a	1228 Pac. Mutual Bldg., Los Angeles	Colton
Chubbuck Lime Co., Chas. I. Chubbuck	a, b, c	5000 Worth St., Los Angeles	Chubbuck
Victorville Lime Rock Co.	b	2149 Bay St., Los Angeles	Victorville
San Mateo County			
Pacific Portland Cement Co.	c, d	111 Sutter St., San Francisco	San Mateo
Santa Clara County			
Bay Shell Co.	c, d	519 California St., San Francisco	Alviso
L. H. Beck	c, d	P. O. Box 113, Colma	Alviso
Bernal California Marl Co., Pedro Bernal	c, e	Edenvale, c/o San Jose	Edenvale
W. B. Ortley Shell Co.	d	Alviso	Alviso
Santa Cruz County			
Henry Cowell Lime and Cement Co., W. H. George, Mgr.	a, b	2 Market St., San Francisco	Santa Cruz
Holmes Lime & Cement Co.	a	Division and De Haro Sts., San Francisco	Felton
Pacific Limestone Prod. Co.	b	Spring St., Santa Cruz	Santa Cruz
Tuolumne County			
U. S. Lime Products Corp.	a, b	58 Sutter St., San Francisco	Sonora

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11—16731	*Ventura County* Tapo Alta Lime & Fertilizer Co., Mrs. M. L. Franklin, Secy.	c, e	412 W. 6th St., Los Angeles	Santa Susana

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

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MAGNESITE

Operator	Address	Location of mine
Santa Clara County		
Sierra Magnesite Co., lessee, Western Magnesite Mine	Box 8A, Newark	Red Mountain
Stanislaus County		
Sierra Magnesite Co., Bald Eagle Mine	Box 8A, Newark	Gustine

MAGNESIUM SALTS

Operator	Product	Address	Location of plant
San Diego County			
California Chemical Corp.	Chloride	Box 8A, Newark	San Diego
San Mateo County			
Marine Chemical Co., R. E. Clarke	Carbonate	South San Francisco	South San Francisco
Plant Rubber & Asbestos Works	Carbonate	537 Brannon St., San Francisco	Redwood City

MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
Amador County			
California Carrara Marble, A. G. Dondero	a	2895 3d St., San Francisco	Pine Grove
Santa Barbara County			
G. Antolini	b	111 E. Gutierrez St., Santa Barbara	Tajiguas
Solano County			
Tolenas Springs Onyx, L. Cardini	c	121 14th St., San Francisco	Tolenas Springs
Tuolumne County			
The Columbia Marble Co., R. H. Van Norden, Secy.	a	413 Rialto Bldg., San Francisco	Columbia

a. Marble. b. Limestone flagstone. c. Onyx and travertine

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MICA

Operator	Address	Mine
Imperial County		
Micatalc Co.	1557 Courtney Ave., Hollywood	Ogilby

MINERAL PAINT

Operator	Address	Location of mine
Alameda County		
C. K. Williams & Co. of California	Shellmound Park, Emeryville	Leona Heights

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MINERAL WATER

Operator		Address	Location of spring
Butte County			
Feather River Canyon Spring Water Co., R. E. Chappell		2215 L St., Sacramento	Pulga
Richardson Springs, Lee Richardson, Mgr.		Chico	Chico
Colusa County			
Cooks Springs, Fred C. Lewe, lessee		Lodoga	Cooks Springs
Contra Costa County			
Alhambra Water Co.		Martinez	Martinez
Lake County			
Adams Mineral Springs, Clarence Prather		Adams, via Middletown	Adams
Bartlett Spring Co.		163 Turk St., San Francisco	Bartlett Springs
Norman Mineral Springs, H. C. Norman, Mgr.		Middletown	Middletown
Witter Springs, Inc., J. A. Carroll, Pres.		39th and Canal Sts., Chicago, Ill.	Witter Springs
Los Angeles County			
Cascade Water Co.		4556 York Blvd., Los Angeles	Los Angeles
Elysian Spring Water Co.		1536 Baxter, Los Angeles	Los Angeles
Holly Spring Water		2298 Holly Dr., Los Angeles	Los Angeles
Magnetic Spring Water Co.		936 Palm Ave., Sherman	Los Angeles
Miracle Water Co., Ltd.		Pantages Theatre Bldg., Hollywood	Hollywood
Mission Spring Water Co.		8938 Keith, Hollywood	Hollywood
Mountain Spring Water Co.		226 S. Avenue 54, Los Angeles	Los Angeles
Pure-lax Mineral Water Co.		3640 Griffin, Los Angeles	Los Angeles
Sparklett Bottled Water Co.		4500 York Blvd., Los Angeles	Los Angeles
Tarzana Mineral Water, San Val Oil and Water Co., Ltd.		416 Palmer Bldg., Los Angeles	Van Nuys
White Rose Spring Water Co.		4835 N. Figueroa St., Los Angeles	Los Angeles
Marin County			
Purity Spring Water Co.		2050 Kearny St., San Francisco	Sausalito
Napa County			
Calistoga Bottling Works, G. Musante		Calistoga	Calistoga
Napa Soda Springs Co., G. H. T. Jackson		7 Front St., San Francisco	Napa
Samuels Soda Spring, N. Herlitz, Mgr.		Monticello	Monticello
Walters Spring Mineral Water Co.		St. Helena	Pope Valley
Orange County			
La Vida Mineral Water Co.		804 Spring Arcade Bldg., Los Angeles	Carbon Canyon

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Placer County			
Ki-la-ga Co.		Lincoln	Valley
Riverside County			
Beulah Springs, Oscar C. McNicholl		Arlington	Arlington
San Bernardino County			
Arrowhead Hot Springs, California Cons. Water Co.		1566 E. Washington Blvd., Los Angeles	Arrowhead
San Diego County			
Rock Springs Co., E. S. Walck		R. 2, Box 442, Escondido	Escondido
San Francisco County			
Blue Crest Beverage Co.		615 Excelsior Ave., San Francisco	San Francisco
Diamond Rock Spring Water Co., L. Paolinelli		247 Naples St., San Francisco	San Francisco
San Luis Obispo County			
Mary Hill Mineral Well Co., Fred Merckel		Paso Robles	Paso Robles
Santa Barbara County			
Veronica Mineral Springs Co.		699 Brannan St., San Francisco	Santa Barbara
Siskiyou County			
The Shasta Water Co.		6th and Brannan Sts., San Francisco	Dunsmuir
Yreka Coco Cola Bottling Works, Fred J. Meamber, Prop.		Yreka	Little Shasta
Sonoma County			
Agua Caliente Springs Co., T. H. Corcoran, Prop.		Agua Caliente	Agua Caliente
Barcal Springs, John Kolling		Preston	Preston
Fetters Mineral Springs, George Fetters		Fetters Springs	Fetters Springs

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MOLYBDENUM

Operator	Remarks	Address	Location of mine
Inyo County			
Pine Creek Mine Dump, Herbert Salinger	a	112 Market St., San Francisco	Bishop
Mono County			
Sunset Claim, H. A. Milburn	b	2309 Fulton St., Berkeley	Bridgeport

a. Shipped in 1933. b. Mined but not sold in 1933.

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PLATINUM

Principal Platinum Producers in California in 1933

Operator	Remarks	Address	Location of mine
Merced County			
Snelling Dredging Co.		Snelling	Snelling
Yuba Consolidated Gold Fields	a	351 California St., San Francisco	Snelling
Sacramento County			
Capital Dredging Co.	a	Balfour Bldg., San Francisco	Folsom
Natomas Co.		Forum Bldg., Sacramento	Natomas
Shasta County			
Gas Point Dredge, Staheli & Cerney		Box 127, Anderson	Gas Point
Stanislaus County			
La Grange Gold Dredging Co.		Mills Bldg., San Francisco	La Grange
Yuba County			
Yuba Consolidated Gold Fields	a	351 California St., San Francisco	Hammonton

a. Not sold.

POTASH

Operator	Product	Address	Location of plant
San Bernardino County			
American Potash and Chemical Co.		Trona	Trona

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PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of quarry
Inyo County			
Chas. Brown	a	Shoshone	Shoshone
Red Mountain Cinder Quarry, H. P. Thelan	a	Little Lake	Little Lake
Tonopah & Tidewater Ry.	b	1014 Central Bldg., Los Angeles	Shoshone
Victorville Lime Rock Co.	a	2149 Bay St., Los Angeles	Coso Junction
Kern County			
Cudahy Packing Co.	b	803 Macy St., Los Angeles	Ceneda
Madera County			
Bennett & Jourden, L. T. Bennett	b	P. O. Box 583, Selma	Friant
Mono County			
California Quarries Corp.	a	1300 Quinby Bldg., Los Angeles	Laws
Napa County			
Pearl Pumice Quarries, Jas. H. Pearl	a	565 Monticello Rd., Napa	Monticello
Pumice Products Co. of California, Geo. Smith [1]	a	3026 Bartlett St., Oakland	Monticello
San Bernardino County			
The Glendinning Co., R. W. Glendinning	a	1031 S. Broadway, Los Angeles	Searles
San Luis Obispo County			
Golden State Cleaner Mine, M. L. Francis	b	Creston	Creston
Siskiyou County			
G. Z. Johnson	a, c	255 California St., San Francisco	Pumice Mountain
Sonoma County			
Frazier Bros. Property, A. W. Frazier	b	2912 Adeline St., Berkeley	Trinity

a. Pumice. b. Volcanic ash. c. Scoria.
[1] Material from Pearl Pumice Quarries.

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Operator	Product	Address	Location of mine
Alameda County			
Leona Chemical Co., D. A. McDonnell		Syndicate Bldg., Oakland	Leona Heights
Shasta County			
Mountain Copper Co., Wm. F. Kett, Mgr.		112 Market St., San Francisco	Matheson

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QUICKSILVER

Principal Quicksilver Producers in California for 1933 out of a Total of 73 Operating Properties

Mine	Operator	Address	Location of mine
Fresno County			
Mercy	W. G. Imel	Box 123, South Dos Palos	Mercy Hot Springs
Kings County			
Frediana	Frediana Mining Co., E. K. Anderson, Mgr.	Parkfield	Parkfield
Lake County			
Anderson	E. N. Schwartz	Lakeport	Anderson Springs
Baker	Albert Baker	Middletown	Lower Lake
Great Western	Bumsted Mining Co., E. J. Bumsted, Mgr.	Middletown	Middletown
Mirabel	Mirabel Quicksilver Co., J. W. Doman, Supt.	Middletown	Middletown
Sulphur Bank	Sulphur Bank Syndicate, W. Bradley, Mgr.	Crocker Bldg., San Francisco	Lower Lake
Wilkenson Bros.	E. J. Wilkenson	Middletown	Middletown
Napa County			
Aetna	Bumsted Mining Co., E. J. Bumsted, Mgr.	Middletown	Aetna Springs
Knoxville	Geo. E. Gamble	Monticello	Monticello
La Joya	Lucky Strike Mining Co.	321 Bush St., San Francisco	Oakville
Oat Hill	R. A. Hanon & Co.	Middletown	Aetna Springs
Switzer Property	Frank Adams	Pope Valley	Pope Valley
San Benito County			
Aurora	B. & L. Development Co., Herbert Lounsberry	1145 Locust Ave., Long Beach	Idria
New Alpine	Geo. A. Klein	424 West St., Hollister	Hernandez
New Idria	New Idria Quicksilver Mines, Inc.	Mer. Exchange Bldg., San Francisco	Idria
Stayton	R. B. Knox	Hollister	Hollister
Wonder	Paul Gonzales (owner)	149 Pleasant St., San Jose	Tres Pinos
San Luis Obispo County			
Cambria	Hamilton Carhartt, Jr.	535 S. Calalena Ave., Pasadena	Cambria
Carson & Capitola	Ellard W. Carson	San Luis Obispo	Adelaida
Little Bonanza	Ed. Dodd	Adelaida	Adelaida

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Santa Barbara County			
Red Rock	O. E. Hanno	Solvang	Solvang
Santa Clara County			
New Almaden (dump) (Senator)	F. P. Hauck & E. Hernandez	San Jose	Almaden
Sonoma County			
Cloverdale	Cavagnaro & Schor	Cloverdale	Cloverdale
Esperanza	Capps & Thompson	Cloverdale	Cloverdale
Trinity County			
Altoona	Altoona Quicksilver Mining Co., J. Frowenfield, Pres.	2446 Washington St., San Francisco	Castella

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SALT

Operator	Product	Address	Location of plant
Alameda County			
Arden Salt Co.		225 Bush St., San Francisco	Newark and Mt. Eden
California et al. Plants, Leslie-California Salt Co.		110 Sansome St., San Francisco	Alvarado
Kern County			
Long Beach Salt Co.		P. O. Box 28, Long Beach	Saltdale
Los Angeles County			
Long Beach Salt Co.		P. O. Box 28, Long Beach	Long Beach
Modoc County			
Surprise Valley Salt Works, Joshua H. Hutchinson		Cedarville	Lake City
Monterey County			
Monterey Bay Salt Co., E. C. Vierra, Mgr.		Moss Landing	Moss Landing
San Bernardino County			
Burham Chemical Co., A. G. Hill, Sec.		6066 Rockridge Blvd., Oakland	Westend
California Rock-Salt Co.		2465 Hunter St., Los Angeles	Amboy
Saline Products, Inc.		2000 Santa Fe Ave., Los Angeles	Amboy
San Diego County			
Western Salt Co.		917 J. D. Spreckels Bldg., San Diego	San Diego
San Mateo County			
Stauffer Chemical Co.		636 California St., San Francisco	Redwood City

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Operator	Product	Address	Location of quarry
Los Angeles County			
Alphonzo Bell Corp.	----------	10601 Chalon Rd., Bel-Air, Los Angeles	Bel-Air
Binder Bros., W. H. Binder	----------	285 N. Lake Ave., Pasadena	Boquet Canyon
Blue Goose Quarry, Robert Cox	----------	1975 Lundy Ave., Pasadena	----------
Daniel J. Poyer	----------	Star Route, Canoga Park	Calabasas
Monterey County			
Sierra Quarry, Harry Rogers	----------	Box 136, Carmel	Carmel
Napa County			
H. F. Galbreath	----------	1742 Solano St., Berkeley	----------

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SILICA

Operator	Product	Address	Location of mine
Contra Costa County			
Hazel-Atlas Glass Co. of California, Ltd.	b	89th Ave. and G St., Oakland	Summerville
Silica Co. of California, Ltd.	b	Brentwood	Brentwood
El Dorado County			
Snow Silica Deposit, Spicky Polish Corp., Owners	a	1401 3d St., San Francisco	Placerville
Inyo County			
Dolomite Products Co.	a	103 N. Kingsley Dr., Los Angeles	Lone Pine
Inyo Marble Co.	c	361 N. Ave. 22, Los Angeles	Lone Pine
Monterey County			
Del Monte Products, A. J. Gunnell	b	Crocker Bldg., San Francisco	Del Monte
Orange County			
I. P. Arnold	b	1946 W. 83d St., Los Angeles	El Toro
Riverside County			
P. J. Weisel	a	La Habra	Corona
San Diego County			
Mineral Milling Co.	a	1081 Richmond St., Los Angeles	White Oak Springs
Standard Sanitary Mfg. Co., R. P. Jones, Mgr.	a	Campo	Campo

a. Quartz. b. Glass sand. c. Quartzite.

SILIMANITE—ANDALUSITE—CYANITE GROUP

Operator	Product	Address	Location of mine
Imperial County			
Vitrefrax Corp.	Cyanite	5050 Pacific St., Vernon, Los Angeles	Ogilby
Mono County			
Champion Spark Plug Co., Ceramic Division	Andalusite	Butler Ave. and Grand Trunk R. R., Detroit, Mich.	Mocalno

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Principal Silver Producers in California in 1933

Mine	Type of mine	Operator	Address	Location of mine
Amador County				
Argonaut	a	Argonaut Mining Co., Ltd.	Jackson	Jackson
Central Eureka and Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Kennedy	a	Kennedy Mining and Milling Co.	519 California St., San Francisco	Martell
Pioneer	a	Pioneer Lucky Strike Gold Mining Co.	Pine Grove	Pine Grove
Butte County				
Surcease	a	Hoefling Bros., Inc.	Chico	Yankee Hill
Inyo County				
Carbonate	c	J. P. Madison	Shoshone	Shoshone
Cerro Gordo	c	Estelle Mines Corp.	972 S. Fourth Ave., Los Angeles	Keeler
Santa Rosa	c	Santa Rosa Min. and Devel. Co.	Keeler	Keeler
Kern County				
Elephant	a	Paul Stapler	Mojave	Mojave
Standard	b	Standard Mining & Milling Co.	Mojave	Mojave
Tropico	a	Burton Bros., Inc., Lessees Tropico Mine	Rosamond	Rosamond
Yellow Aster	a	Yellow Aster Mining & Milling Co.	Randsburg	Randsburg
Nevada County				
Empire and North Star	a	Empire-Star Mines Co., Ltd.	Rm. 1507-14, Wall St., New York, N. Y.	Grass Valley
Empress	a	Empress Gold Mining Co.	Box 914, Grass Valley	Grass Valley
Golden Center	a	Cooley Butler	Rowan Bldg., Los Angeles	Grass Valley
Idaho-Maryland	a	Idaho-Maryland Mines Co.	Russ Bldg., San Francisco	Grass Valley
Spanish	a	Spanish Mining Co.	Crocker Bldg., San Francisco	Washington
Sacramento County				
Capital	a	Capital Dredging Co.	Balfour Bldg., San Francisco	Folsom
Natomas	a	Natomas Co.	Forum Bldg., Sacramento	Natomas
San Bernardino County				
Kelly	a	Kelly Gold and Silver Mines, Inc.	Mojave	Randsburg
Telegraph	a	O. P. Ricker	Nipton	Nipton
Shasta County				
Iron Mountain	a	The Mountain Copper Co., Ltd.	112 Market St., San Francisco	Matheson
Sierra County				
Original 16 to 1	a	Original 16 to 1 Mines, Inc.	Russ Bldg., San Franicsco	Alleghany

a. Gold. b. Silver. c. Silver-Lead. d. Copper.

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SLATE

Operator	Product	Address	Location of quarry
El Dorado County			
Pacific Minerals Co., Ltd.		337 10th St., Richmond	Chili Bar
Inyo County			
Red Slate Quarry, J. D. Leary		Keeler	Keeler
Tuolumne County			
Witney Slate Quarry, W. S. McLean		1919 San Bruno Ave., San Francisco	Hetch Hetchy

SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
Butte County			
McLean Talc Deposit, W. S. McLean	a	1919 San Bruno Ave., San Francisco	McLean Spur
El Dorado County			
Pacific Minerals Co., Ltd., Chas. S. Renwick	a	337 10th St., Richmond	Shrub
Inyo County			
Pacific Non-Metalics Corp., Paul Judson, Secretary	b	Foss Bldg., Pasadena	Darwin
Sierra Talc Co., Franklin Booth, Mgr.	b	428 Union League Bldg., Los Angeles	Keeler
Los Angeles County			
Victorville Lime Rock Co.	a	2149 Bay St., Los Angeles	Bouquet Canyon
San Bernardino County			
The Glendinning Co., R. W. Glendinning	b	1031 S. Broadway, Los Angeles	Searles
Pacific Coast Talc Co.	b	2149 Bay St., Los Angeles	Silver Lake
Western Talc Co.	b	1901 E. Slauson Ave., Los Angeles	Acme

a. Soapstone. b. Talc.

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SODA

Operator	Product	Address	Location of plant
Inyo County			
Natural Soda Products Co.	----------	650 S. Spring St., Los Angeles	Keeler
Pacific Alkali Co.	----------	1206 Pacific Mutual Bldg., Los Angeles	Bartlett
San Bernardino County			
West End Chemical Co.	----------	706 Syndicate Bldg., Oakland	West End

SULPHUR

Operator	Product	Address	Location of mine
Alpine County			
Leviathan Sulphur Co., H. Kenyon Burch, Pres.	----------	1010 Richfield Bldg., Los Angeles	Markleeville
Inyo County			
Crater Sulphur Deposit, Morris Albertali	----------	Big Pine	Last Chance Mountain

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STONE, MISCELLANEOUS

Under the heading of stone, miscellaneous, there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes all crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission produces both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
Alameda County			
Alameda County	a, b	Oakland	
California Rock & Gravel Co.	a	500 Call Bldg., San Francisco	Livermore
Heafey-Moore Co., Leona Quarry	b	344 High St., Oakland	Oakland
Otto Hirsch	a	Irvington	Irvington
Kaiser Paving Co.	a	1522 Latham Square Bldg., Oakland	Eliot
Kemp Bros.	b	Rt. 1, Box 197, Strobridge Ave., Hayward	Hayward
Langdon Molding Sand, J. H. Langdon	c	R. F. D., Box 89, Niles	Decoto
Red Shale Quarry, W. S. McLean	d	1919 San Bruno Ave., San Francisco	Arroyo Mocho
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Alfred W. Petersen	a	P. O. Box, 943, Livermore	Livermore
Ramos Quarry, Ramos Bros.	a	C and 7th Sts., Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Amador County			
Amador County	a, b	Jackson	
Butte County			
Butte County	a, b	Oroville	
Bechtel-Kaiser Co., R. J. Kennedy, Mgr.	a, b	Oroville	Oroville
Cherokee Sand and Gravel Co., C. W. & E. E. Myers	a	Rt. 4, Box 127, Chico	Cherokee Flat
Lord & Bishop	a, b	Box 547, Oroville	Oroville
McLean Quarry, W. S. McLean	d	1919 San Bruno Ave., San Francisco	McLean Spur
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
Calaveras County			
Calaveras County	a	San Andreas	
Pacific Minerals Co., Ltd.	d	337 10th St., Richmond	Angels
Contra Costa County			
Contra Costa County	a	Martinez	
Antioch Asphalt Sand Co.	a	2008 Mission St., San Francisco	Antioch
Blake Bros. Co., Anson S. Blake	b	204 Balboa Bldg., San Francisco	Point Richmond
Coburn Sand Plant, C. W. Coburn	a	1931 Santiago St., San Francisco	Antioch

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Hutchison Co., Stege Quarry	b	1450 Harrison St., Oakland	Stege
Oak Point Sand Co., Robert P. Easley	a	Antioch	Antioch
Silico Co. of Calif., Ltd.	c	Brentwood	Brentwood
Southern Pacific R. R. Co.	g	Southern Pacific Bldg., San Francisco	Mococo
Del Norte County			
Del Norte County	a	Crescent City	----------
El Dorado County			
Diamond Springs Lime Co.	b	Diamond Springs	Diamond Springs
Fresno County			
Grant-Service Rock Co., Cons.	a, b	T. W. Patterson Bldg., Fresno	El Prado
Pacific Coast Aggregates, Inc.	b	85 2d St., San Francisco	Piedra
Glenn County			
Southern Pacific Co.	a	65 Market St., San Francisco	Wyo
Humboldt County			
D. A. Boyd	a	R. F. D., Arcata	Arcata
Henistreel & Bell	a, b	501 11th St., Marysville	----------
Mercer-Fraser Co.	a	2d and Commercial Sts., Eureka	Essex
Northwestern Pacific R. R. Co., Wm. N. Neff, Gen. Supt.	a	Sausalito	South Fork
U. S. Bureau of Public Roads	a, b	Sheldon Bldg., San Francisco	----------
Imperial County			
Imperial Irrigation Dist., Gen. Supt. River Div.	a, b	Andrade	Andrade
Potholes Granite Quarry, U. S. Bureau of Reclamation	b	Winterhaven, c/o Yuma, Ariz.	Winterhaven
Inyo County			
Inyo Marble Co.	b, d	406 S. Main St., Los Angeles	Lone Pine
Kern County			
Bakersfield Rock and Gravel Co.	a, b	Box 395, Station A, Bakersfield	----------
Kern Rock Co., Ltd.	a	P. O. Box 1697, Bakersfield	Kern River
Lake County			
Lake County	a	Lakeport	----------
Jim Gunn, Jr.	a	Kelseyville	Kelseyville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag. f. Tube mill pebbles. g. Decomposed granite.

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STONE, MISCELLANEOUS—Continued

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Operator	Product	Address	Location of pit or quarry
Lassen County			
Lassen County	a	Susanville	Susanville
Hein Bros. Basalt Rock Co.	b	Petaluma	Susanville
Los Angeles County			
Arrow Rock Co.	a	P. O. Box 155, Monrovia	Monrovia
A., T. & S. F. R. R., I. L. Hibbard, Gen. Mgr.	a	609 Kerckhoff Bldg., Los Angeles	Forbes
Azusa Rock & Sand Co.	a, b	R. F. D., Azusa	Azusa
Richard R. Ball	a	Box 233, Walteria	Walteria
Bengal & Sons	a	1709 Monte Vista, Pasadena	Pasadena
Blue Diamond Corp., Ltd.	a	1650 S. Alameda St., Los Angeles	El Monte and Roscoe
Wm. J. Bonfield	g	2008 Laurel Canyon Rd., Los Angeles	Hollywood
L. Chandler	b	Lomita	Lomita
Consolidated Rock Products Co.	a, b	656 S. Los Angeles St., Los Angeles	Whittier and Fullerton
Ducey & Atwood Rock Co., R. K. Atwood, Pres.	a, b	Box 194, East Pasadena	East Pasadena
Eaton Canyon Rock and Sand Co.	a, b	2350 E. Colorado St., Pasadena	Pasadena
Graham Bros.	a, b, g	Long Beach	Catalina Island and Roscoe. El Monte and Rancho Qua's
Granite Materials Co.	g	7343 Diez St., North Hollywood	North Hollywood
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Harbor Dept., Bureau of Maintenance	b	City Hall, San Pedro	Santa Catalina
Los Angeles Dept. of Water and Power	b	207 S. Broadway, Los Angeles	----------
Los Angeles & Salt Lake R. R.	a	Pacific Electric Bldg., Los Angeles	----------
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	----------
Reynolds Crushed Gravel	b, g	920 N. Humphreys Ave., Los Angeles	Los Angeles
San Antone Rock Co.	a	Claremont	Claremont
Santa Catalina Island Co.	a, b, g	Avalon	Santa Catalina Island
Security Material Co.	a	916 N. Formosa St., Los Angeles	Los Angeles
Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	Lomita
State Decomposed Granite Co.	g	2272 Laurel Canyon Blvd., Los Angeles	Hollywood
Venable Bros.	a	8831 Prince Ave., Los Angeles	Los Angeles
Madera County			
U. S. Forest Service	a	Wells Fargo Bldg., San Francisco	----------

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Marin County			
Marin County	a	San Rafael	----------
Daniels Con. Co.	b	503 Market St., San Francisco	San Rafael
Hutchison Company	b	1450 Harrison St., Oakland	San Quentin
Mariposa County			
Mariposa County	a	Mariposa	----------
Kelm Jasper Quarry, Pioneer Paper Co.	d	5500 S. Alameda St., Los Angeles	Bagby
Frank B. Marks	b	Newman	----------
U. S. Bureau of Public Roads	a, b	Sheldon Bldg., San Francisco	Yosemite Park
Yosemite National Park	a, b	Yosemite	Yosemite Ntl. Park
Mendocino County			
Ukiah Gravel & Cement Co., John Freitas	a	Ukiah	Ukiah
Merced County			
Merced County	a	Merced	Los Banos
Hammatt Gravel Plant, V. M. Hammatt	a	Merced	Merced
J. W. Huffman, Bair Creek Gravel Pit	a	Merced	Merced
Modoc County			
The Renshaw Sand, Rock & Gravel Co.	a	Alturas	Alturas
Hemstreet & Bell	b	501 11th St., Marysville	----------
U. S. Bureau of Public Roads	b	Sheldon Bldg., San Francisco	----------
Monterey County			
Monterey County	a	Salinas	King City
Del Monte Properties, A. J. Gunnell	a, c	401 Crocker Bldg., San Francisco	Pacific Grove
Monterey Sand Co.	a, c	Monterey	Monterey
M. J. Murphy	a, b	Monte Verde and 9th Sts., Carmel	Carmel
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Lapis and Prattco
S. Ruthven, Seaside Sand Pit	a	Seaside	Seaside
Southern Pacific Co.	a	65 Market St., San Francisco	Lapis
Napa County			
Napa County	a, b	Napa	Napa
Basalt Rock Co.	b	8th St., Napa	Napa
John Cassaretto	a	6th and Channel Sts., San Francisco	Napa
Errington Quarry, Ray Errington	a	Napa	Napa
Napa & Calistoga S. F. R. R., Butala Gravel Pit	a	Napa	St. Helena
Harold Smith	a	St Helena	St. Helena
Thorsen Gravel Pit, Harry Thorsen	a	St. Helena	St. Helena

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag. f. Tube mill pebbles. g. Decomposed granite.

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STONE, MISCELLANEOUS—Continued

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Operator	Product	Address	Location of pit or quarry
Nevada County			
Nevada County	b	Nevada City	
Orange County			
Orange County	g	Santa Ana	
Consolidated Rock Products Co.	a, b	656 S. Los Angeles St., Los Angeles	Whittier and Fullerton
Graham Bros.	a, b	Long Beach	El Modena
A. J. Jorgensen	a	Garden Grove	Garden Grove
National Cement Pipe Co.	a	Drawer K, Santa Ana	Santa Ana
Reynolds Gravel Service	g	715 Hickory St., Santa Ana	Santa Ana
Spurlock Sand Pit	a	Garden Grove	Garden Grove
B. A. Stoffel	a	Anaheim	Anaheim
Ralph Welch	a	2609 W. Chapman St., Orange	Orange
Placer County			
Alexson Granite Co.	b	Rocklin	Rocklin
Auburn Lumber Co.	a	Auburn	Auburn
A. Pernu Granite Quarries, Adolph Pernu	b	Rocklin	Rocklin
Union Granite Co., Mat Ruhkala	b	Rocklin	Rocklin
Plumas County			
U. S. Bureau of Public Roads	b	Sheldon Bldg., San Francisco	
Riverside County			
Riverside County	a	Court House, Riverside	
Graham Bros.	b	Long Beach	Thermal
Kumpe-Hauser Construction Co., Ormand Quarry	b	Rt. 2, Riverside	Bly Junction
Kuster & Waterburg	a	Corona	Corona
Mutual Rock & Gravel Co.	a	Riverside	Riverside
Nevada-Pacific Mineral Co., Inc.	c	3363 Fruitland Rd., Los Angeles	Grand Terrace
Palo Verdi Commercial Co.	a	Blythe	Blythe
City of Riverside	b	Riverside	Riverside
The Service Gravel Co., F. A. Braman	a	4324 10th St., Riverside	Riverside
P. J. Weisel, Industrial Sands	a, c	La Habra	Corona

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Sacramento County			
Cannon & Co.	c	Box 281, Sacramento	Ben Ali
Del Paso Rock and Gravel Co.	a, b	H St. Rd., Sacramento	Del Paso
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Fair Oaks, Mayhew and American River
Robert Powell & Co.	a	P. O. Box 815, Sacramento	American River
San Benito County			
San Benito County	a, b	Hollister	
Granite Rock Co.	b	Drawer M, Watsonville	Logan
Southern Pacific Co.	a, b	65 Market St., San Francisco	Logan
San Bernardino County			
A., T. & S. F. R. R.	a	609 Kerckhoff Bldg., Los Angeles	Gale
Commercial Rock Co.	a	14th and Campus Sts., Upland	Upland
Consolidated Rock Products Co.	a, b	656 S. Los Angeles St., Los Angeles	
Declezville Stone Co., Ltd.	b	Box 698, San Pedro	S. Fontana
Hanawalt Bros.	a, b	2151 D St., La Verne	La Verne
Fourth Street Rock Crusher, A. O. Johnson	a	San Bernardino	San Bernardino
Pacific Minerals, Inc.	d	337 10th St., Richmond	Barstow
Pinneys Sand & Rock Service	a, b	Redlands	Redlands
Redlands Gravel Co.	a, b	Redlands	Redlands
San Bernardino Rock and Gravel Co.	a	311 Platt Bldg., San Bernardino	San Bernardino
Triangle Rock & Gravel Co.	a, b	San Bernardino	San Bernardino
San Diego County			
Calavera Rock Corp.	b	Oceanside	Oceanside
Canyon Rock Co.	a, b	3911 5th Ave., San Diego	San Diego
Crystal Silica Sand Co.	a	Oceanside	Oceanside
H. G. Fenton Material Co.	a	13th and Imperial Ave., San Diego	San Diego
Jones & Klinger, E. J. Klinger	a	Mission Valley, San Diego	Mission Valley
R. M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego
John T. Momand	f	Box 381, Carlsbad	Oceanside
Nelson & Sloan	a	P. O. Box 832, Chula Vista	Chula Vista
Oceanside Rock & Sand Co.	a	Carlsbad	Oceanside
H. W. Rohl & Co.	a, b	4351 Alhambra Ave., Los Angeles	El Capitan Dam
San Francisco County			
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco
San Joaquin County			
Frank Marks	a, b	Newman	Tracy
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Santa Fe Sand and Gravel Co., W. A. Arlington	a	P. O. Box 271, Escalon	Escalon

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag. f. Tube mill pebbles. g. Decomposed granite.

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STONE, MISCELLANEOUS—Continued

Under the heading of stone, miscellaneous, there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes all crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
San Mateo County			
M. F. Cunha, Vasques Quarry	b	Main St., Half Moon Bay	Half Moon Bay
Half Moon Bay Feed & Fuel Co., Torpy Quarry	b	Half Moon Bay	Half Moon Bay
Holy Cross Cemetery	b	Colma	Colma
Industrial Mineral Products, W. B. Vestal	c	772 Bryant St., San Francisco	
Market St. Ry. Co., Daly's Quarry	b	58 Sutter St., San Francisco	Daly City
Ratterree Bros. Co.	b	400 Walbridge Blvd., San Francisco	South San Francisco
Skyline Quarry, Parker Pugh	b	Box 202, Redwood City	Skyline Blvd.
Santa Barbara County			
Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
Lompoc, Harry Howerton, Street Supt.	a	Lompoc	Lompoc
Santa Clara County			
County Surveyor, Santa Clara County	b	Hall of Records, San Jose	
Arrowhead Gravel Co.	a	20 Maple Ave., Watsonville	Watsonville
Carroll Gravel Pit, R. D. Carroll	a	Rt. 4, Box 310A, San Jose	San Jose
A. G. Jahn	a	Rt. 4, Box 362, San Jose	San Jose
Jas. A. Lemieux	a	Box 341, Senter Rd., San Jose	San Jose
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
J. W. Lovejoy	b	Rt. 1, Box 88, Mountain View	Mountain View
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
Robinson & Rhodes, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
Southern Pacific Co.	a	65 Market St., San Francisco	Coyote
Taaffe Construction Co.	b	Los Altos	Los Altos
Santa Cruz County			
Santa Cruz County	b	Santa Cruz	Santa Cruz
Central Supply Co.	a	P. O. Box 524, Santa Cruz	Santa Cruz
Santa Cruz Portland Cement Co.	b	Crocker Bldg., San Francisco	Davenport
Shasta County			
Crews Gravel Pit, Philip Crews	a	17 N. Pine St., Redding	Sacramento River
Diestelhorst Gravel Plant, Chas. Diestelhorst	a, b	1040 Liberty St., Redding	Redding
Lassen Volcanic National Park	b	Mineral, via Red Bluff	Lassen Volcanic National Park
U. S. Bureau of Public Roads	a, b	461 Market St., San Francisco	Lassen Volcanic National Park

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Sierra County			
Sierra County	a	Downieville	
Siskiyou County			
Siskiyou County	a, b	Yreka	
W. D. Miller Cons. Co.	a	Klamath Falls, Ore.	Graham Siding
Solano County			
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
Sonoma County			
Sonoma County	a, b	Santa Rosa	
Basalt Rock Co.	a	8th St., Napa	Healdsburg
S. Cabrol	b	Glen Ellen	Glen Ellen
Commercial Gravel Co., H. G. Burrowes	a	530 Mills Bldg., San Francisco	Geyserville
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Helberg Gravel Plant	a	Rt. 1, Sonoma	Shellville
Independent Gravel Co.	a	Forestville	Forestville
Mirabel Gravel Co., S. Cangros	a	222 3d St., San Rafael	Mirabel
Petaluma and Santa Rosa, E. R. R., E. H. Maggard, Mgr.	b	Petaluma	Stony Point
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Rt.	Stony Point
Chas. Tracey	a	Sonoma	Sonoma
Stanislaus County			
Atlas Olympia Co.	a	209 Underwood Bldg., San Francisco	Orange Blossom
W. Haslan	a	Oakdale	Oakdale
Frank B. Marks	a, b	Newman	Crows Landing
Oakdale Irrigation Dist., M. E. Robinson, Auditor	a	Oakdale	Oakdale
Putman Sand & Gravel Co.	a	Modesto	Modesto
Rinehart Sand Pit, Rinehart Bros.	a	Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Southern Pacific Co.	a	65 Market St., San Francisco	Newman
Tehama County			
Tehama County	a, b	Red Bluff	
U. S. Bureau of Public Roads	a, b	461 Market St., San Francisco	
Trinity County			
Trinity County	a	Weaverville	
Roy Eastwood	a	Weaverville	Weaverville
U. S. Forest Service	a	85 2d St., San Francisco	

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag. f. Tube mill pebbles. g. Decomposed granite. h. Earth.

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STONE, MISCELLANEOUS—Continued

Under the heading of stone, miscellaneous, there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes all crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Tulare County			
Tulare County	g	Visalia	
J. J. Duggan	a	Porterville	Portersville
Hemstreet & Bell	a, b	501 11th St., Marysville	
O. C. Jeffers	a	Star Rt. 2, Porterville	Portersville
Porterville Cement Pipe Co.	a	P. O. Box 396, Porterville	Porterville
Supt. Sequoia National Park	a, b	Three Rivers	Sequoia Natl. Park
Tulare Rock Co., O. Holliday	a, b	Lindsay	Lindsay
U. S. Bureau of Public Roads	a, b	411 Market St., San Francisco	Sequoia Park
Tuolumne County			
McLean Quarry, W. S. McLean	d	1919 San Bruno Ave., San Francisco	Sonora
Ventura County			
Ventura County	b	Ventura	
El Rio Rock Co.	a, b	P. O. Box 381, Ventura	El Rio
Fillmore Rock Co.	a, b	Fillmore	Fillmore
Piru Rock Co.	a, b	Piru	Piru
Santa Clara Sand and Gravel Co.	a	P. O. Box 1002, Ventura	Ventura
Santa Paula Rock Co.	a	Willard Bridge, Santa Paula	Santa Paula
Saticoy Rock Products Co.	a, b	Saticoy	Saticoy-Ventura
Ventura Velvet Molding Sand, Chas. A. Cole	c	1355 Church St., Ventura	Ventura
Southern Pacific Co.	a, b	65 Market St., San Francisco	Rockbank
Yolo County			
Yolo County	a	Woodland	
C. and H. Gravel Co., J. J. Hartley	a	Davis	Davis
Yolo Gravel Co.	a	P. O. Box 7, Yolo	Yolo
Yuba County			
Hemstreet & Bell	a, b	501 11th St., Marysville	
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Marysville
Yuba River Sand Co.	a	Marysville	Marysville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. g. Decomposed granite.

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TUNGSTEN

Operator	Address	Location of mine
Inyo County		
Pine Creek Mine Dump, Herbert Salinger	112 Market St., San Francisco	Bishop
San Bernardino County		
Altolia Mining Co., A. V. Udell	Crocker Bldg., San Francisco	Randsburg
Tulare County		
Tungsten Mine, H. O. Johanson	Posey	Posey

WOLLASTONITE

Operator	Address	Location of mine
Kern County		
John T. Thorndyke	10144 N. Mariposa Ave., Los Angeles	Code Siding

ZINC

Mine	Operator	Address	Location of mine
Inyo County			
Cerro Gordo	Estelle Mines Corp.	972 S. 4th Ave., Los Angeles	Keeler
Nevada County			
Spanish	Spanish Mining Co.	Crocker Bldg., San Francisco	Washington

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APPENDIX

MINING BUREAU ACT

Chap. 679 [Stats. 1913]; amended, Chap. 280 [Stats. 1929]; amended, Chap. 748 [Stats. 1933].

An act establishing a state mining bureau, creating the office of state mineralogist, fixing his salary and prescribing his powers and duties; providing for the employment of officers and employees of said bureau, making it the duty of persons in charge of mines, mining operations and quarries to make certain reports, providing for the investigation of mining operations, dealings and transactions and the prosecution for defrauding, swindling and cheating therein, creating a state mining bureau fund for the purpose of carrying out the provisions of this act and repealing an act entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all acts amendatory thereof and supplemental thereto or in conflict herewith.

[Approved June 16, 1913. In effect August 10, 1913.]

[Amendment (Sec. 16) approved May 14, 1929. In effect August 14, 1929.]
[Amendment (Sec. 10) approved June 5, 1933. In effect August 21, 1933.]

The people of the State of California do enact as follows:

SECTION 1. There is hereby created and established a state mining bureau. The chief officer of such bureau shall be the state mineralogist, which office is hereby created.

SEC. 2. It shall be the duty of the governor of the State of California and he is hereby empowered to appoint a citizen and resident of this state, having a practical and scientific knowledge of mining, to the office of state mineralogist. Said state mineralogist shall hold his office at the pleasure of the governor. He shall be a civil executive officer. He shall take and subscribe the same oath of office as other state officers. He shall receive for his services a salary of three hundred dollars ($300) per month, to be paid at the same time and in the same manner as the salaries of other state officers. He shall also receive his necessary traveling expenses when traveling on the business of his office. He shall give bond for the faithful performance of his duties in the sum of ten thousand dollars ($10,000), said bond to be approved by the governor of the state of California.

SEC. 3. Said state mineralogist shall employ competent geologists, field assistants, qualified specialists and office employees when necessary in the execution of his plans and operations of the bureau, and fix their compensation. The said employees shall be allowed their necessary traveling expenses when traveling on the business of said department and shall hold office at the pleasure of said state mineralogist.

SEC. 4. It shall be the duty of said state mineralogist to make, facilitate, and encourage, special studies of the mineral resources and mineral industries of the state. It shall be his duty: to collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use; to make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance, such collection constituting the museum of the state mining bureau; to provide a library of books, reports, drawings, bearing upon the mineral industries, and sciences of mineralogy and geology, and arts of mining and metallurgy, such library constituting the library of the state mining bureau; to make a collection of models, drawings and descriptions of the mechanical appliances used in mining and metallurgical processes; to preserve and so maintain such collections and library as to make them available for reference and examination, and open to

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public inspection at reasonable hours; to maintain, in effect, a bureau of information concerning the mineral industries of this state, to consist of such collections and library, and to arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it; to issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this state.

SEC. 5. It is hereby made the duty of the owner, lessor, lessee, agent, manager or other person in charge of each and every mine, of whatever kind or character, within the state, to forward to the state mineralogist, upon his request, at his office not later than the thirty-first day of March, in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men then employed, the method of working such mine and the general condition thereof, the total mineral production for the past year, and such owner, lessor, lessee, agent, manager or other person in charge of any mine within the state must furnish whatever information relative to such mine as the state mineralogist may from time to time require for the proper discharge of his official duties. Any owner, lessor, lessee, agent, manager or other person in charge of each and every mine of whatever kind or character within the state, who fails to comply with the above provisions shall be deemed guilty of a misdemeanor.*

SEC. 6. The state mineralogist now performing the duties of the office of state mineralogist shall perform the duties of the office of state mineralogist as in this act provided until the appointment and qualification of his successor as in this act provided.

SEC. 7. The said state mineralogist shall take possession, charge and control of the offices now occupied and used by the board of trustees and state mineralogist and the museum, library and laboratory of the mining bureau located in San Francisco as provided for by a certain act of the legislature approved March 23, 1893, and hereafter referred to in section fourteen hereof, and shall maintain such offices, museum, library and laboratory for the purposes provided in this act.

SEC. 8. Said state mineralogist or qualified assistant shall have full power and authority at any time to enter or examine any and all mines, quarries, wells, mills, reduction works, refining works and other mineral properties or working plants in this state in order to gather data to comply with the provisions of this act.

SEC. 9. The state mineralogist shall make a biennial report to the governor on or before the fifteenth day of September next preceding the regular session of the legislature.

SEC. 10. All moneys received by the State Mining Bureau (or State Division of Mines) or any officer thereof, from sales of publications issued by said bureau, shall be deposited at least once each month in the State treasury to the credit of a fund which is hereby created and designated "Division of mines revolving printing fund." Said fund shall be used and is hereby appropriated for the use of said bureau in addition to such other funds as may be from time to time appropriated by the Legislature, for the printing and publishing of reports, bulletins, and maps issued by the said bureau. The State Controller is authorized to require financial reports from the State Mining Bureau or any officer thereof.

SEC. 11. The said state mineralogist is hereby authorized and empowered to receive on behalf of this state, for the use and benefit of the state mining bureau, gifts, bequests, devises and legacies of real or other property and to use the same in accordance with the wishes of the donors, and if no instructions are given by said donors, to manage, use, and dispose of the gifts and bequests and legacies for the best interests of said state mining bureau and in such manner as he may deem proper.

SEC. 12. The state mineralogist may, whenever he deems it advisable, prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the state.

SEC. 13. The state minerologist is hereby empowered to fix a price upon and to dispose of to the public, at such price, any and all publications of the state mining bureau, including reports, bulletins, maps, registers or other publications, such price shall approximate the cost of publication and distribution. Any and all sums derived from such disposition, or from gifts or bequests made, as hereinbefore provided must be accounted for by said state mineralogist and turned over to the state treasurer to be credited to the mining bureau fund as provided for in section

* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

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ten. He is also empowered to furnish without cost to public libraries the publications of the bureau and to exchange publications with other geological surveys and scientific societies, etc.

SEC. 14. The state mineralogist provided for by this act shall be the successor in interest of the board of trustees of the state mining bureau, and the state mineralogist, under and by virtue of that certain act, entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to to be known as the board of trustees of the state mining bureau, who shall have the direction, management, and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all books, papers, documents, personal property, records, and property of every kind and description obtained or possessed, or held or controlled by the said board of trustees of the said state mining bureau, and the state mineralogist, and the clerks and employees thereof, under the provisions of said act of March 23, 1893, or any act supplemental thereto or amendatory thereof, shall immediately be turned over and delivered to the said state mineralogist herein provided for, who shall have charge and control thereof.

SEC. 15. That certain act entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, and to provide for the appointment, duties and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction, and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, together with all acts amendatory thereof and supplemental thereto and all acts in conflict herewith are hereby repealed.

SEC. 16. For the purpose of this act and as used herein the term "mine" is hereby defined to embrace and include all mineral bearing properties of whatever kind or character whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained, and the term "mineral" for the purposes of this act and whenever so used shall embrace and include any and all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

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DEPARTMENT OF NATURAL RESOURCES ACT

Chap. 128 [Stats. 1927]; amended, Chap. 307 [Stats. 1929.]

An act to add a new article to chapter three of title one of part three of the Political Code to be numbered article two j, embracing sections three hundred seventy-three to three hundred seventy-three i, relating to a department of natural resources.

[Approved by the Governor April 13, 1927.]

[Amendment approved May 18, 1929.]

The people of the State of California do enact as follows:

SECTION 1. The Political Code is hereby amended by adding a new article to chapter III of title I of part III thereof, to be numbered article II*f*, embracing sections 373 to 373*i* and to read as follows:

ARTICLE II*j*.

DEPARTMENT OF NATURAL RESOURCES.

373. A department of the government of the State of California to be known as the department of natural resources is hereby created. The department shall be conducted under the control of an executive officer to be known as the director of natural resources, which office is hereby created. The director shall be appointed by and hold office at the pleasure of the governor and shall receive a salary of six thousand dollars per annum.

Except as in this article otherwise provided, the provisions of article II of this chapter, title, and part of the Political Code as adopted at the forty-fourth session of the Legislature and as the same may be amended from time to time, shall govern and apply to the conduct of the department of natural resources in every respect the same as if such provisions were herein set forth at length and wherever in said article II the term "head of the department" or similar designation occurs, the same shall for the purposes of this article mean the director of natural resources.

373*a*. For purposes of administration the department shall be forthwith organized by the director thereof, subject to the approval of the governor, in such manner as he shall deem necessary to properly segregate and conduct the work of the department, and the director shall have power to appoint, in accordance with the civil service and other provisions of law, such deputies, officers and other expert and clerical assistants as may be necessary. The work of the department is hereby divided into at least four divisions to be known as the division of forestry, the division of parks, the division of fish and game, and the division of mines.

373*b*. The division of mines shall be administered through a chief who shall be appointed by the director of natural resources upon the nomination of the state mining board, the chief to be a technically trained mining engineer and to be known as the state mineralogist; such chief shall receive a salary of six thousand dollars per annum. General policies for the guidance of the division of mines shall be determined by a board to be known as the state mining board, which shall consist of five members appointed by and to hold office at the pleasure of the governor.

373*c*. The division of forestry shall be administered through a chief of division who shall be known as the state forester, who shall be a technically trained forester, appointed by the director of natural resources upon nomination by the state board of forestry hereinafter provided. General policies for the guidance of the division of forestry shall be determined by a state board of forestry which shall consist of seven members appointed by and holding office at the pleasure of the governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with the live stock industry, one with general agriculture and one with the problems of water conservation.

373*d*. The division of parks shall be administered through a chief of division who shall be appointed by the director of natural resources upon nomination by the state park commission hereinafter provided. General policies for the administration of the state park system shall be determined by the state park commission

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which is hereby created to consist of five members appointed by the governor and holding office at his pleasure.

373*e*. The division of fish and game shall be administered through a fish and game commission consisting of three members appointed by and holding office at the pleasure of the governor.

373*f*. The chiefs of the divisions of forestry and parks respectively shall receive such salaries as may be determined by the director with the approval of the governor. The director of natural resources and the chief of each division before entering upon his duties shall execute to the State of California an official bond in the penal sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties. The members of the board of forestry, the state parks commission and fish and game commission shall serve without compensation, but shall be entitled to their actual expenses incurred in the performance of their duties.

373*g*. The department of natural resources shall succeed to and is hereby invested with all the duties, powers, purposes, responsibilities and jurisdiction of the state mining bureau, state mineralogist, department of petroleum and gas, state oil and gas supervisor, state forester, state board of forestry, California redwood park commission, San Pasqual battlefield commission, Mount Diablo park commission, state fish and game commission, state fish and game commissioners, and, except as herein otherwisee provided, of the several officers, deputies and employees of such bodies and offices, and whenever by the provisions of any statute or law now in force or that may hereafter be enacted a duty or jurisdiction is imposed or authority conferred upon any of said officers, offices, bodies, deputies or employees by any statute the enforcement of which is transferred to the department, such duty, jurisdiction and authority are hereby imposed upon and transferred to the department of natural resources and the appropriate officers thereof with the same force and effect as though the title of said department of natural resources had been specifically set forth and named therein in lieu of the name of any such body, office, officer, deputy or employee. Said bodies and offices, the duties, powers, purposes, responsibilities and jurisdiction of which are so transferred and vested in the department of natural resources, and the positions of all officers, deputies and employees thereunder, are and each of them is hereby abolished and shall have no further legal existence, but the statutes and laws under which they existed and all laws prescribing their duties, powers, purposes, responsibilities and jurisdiction, together with all lawful rules and regulations established thereunder are hereby expressly continued in force.

The department of natural resources shall be in possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property real or personal now or hereafter held for the benefit or use of said bodies, offices and officers.

The boards of district oil and gas commissioners, the offices of district oil and gas commissioners and the board of review, correction and equalization created by the act approved June 10, 1915, establishing the department of petroleum and gas, are hereby respectively continued in force wiith the powers, duties, responsibilities and jurisdiction in them vested by the provisions of said act approved June 10, 1915, as amended; *provided*, that said board of review shall consist of the director of natural resources, the director of finance and the chairman of the state board of equalization.

373*h*. The management and control of the property acquired by the State of California under or pursuant to the provisions of the act entitled "An act to accept the gift to the state of San Pasqual battlefield in San Diego county, to provide for collecting and systematizing the history of said battle, for determining the exact location thereof, and to report a suitable method of marking said battlefield and commemorating the heroism of those Americans who fought and died there," approved May 11, 1919, is hereby transferred to and vested in the department of natural resources.

373*i*. From and after the date upon which this act takes effect, the department of natural resources shall be and is hereby authorized and empowered to expend the moneys in any appropriation or in any special fund in the state treasury now remaining or made available by law for the administration of the provisions of all the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office or officer whose duties, powers, and functions are, by the provisions of this article, transferred to and conferred upon the department of natural resources. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which such appropriations were made or such special funds created.

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PUBLICATIONS OF THE DIVISION OF MINES

During the past fifty-four years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Santa Paula, Coalinga, Taft, Bakersfield. They may also be found in many public, private and technical libraries in California and other States and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained by addressing any of the above offices and enclosing the requisite amount in the case of publications that have a list price. Only coin, stamps or money orders should be sent, and it will be appreciated if remittance is made in this manner rather than by personal check.

Money orders should be made payable to the Division of Mines.

NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

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REPORTS

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	Price	Shipping Charges
**First Annual Report of the State Mineralogist, 1880, 43 pp. Henry G. Hanks	----	----
**Second Annual Report of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks	----	----
**Third Annual Report of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks	----	----
**Fourth Annual Report of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks	----	----
**Fifth Annual Report of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks	----	----
**Sixth Annual Report of the State Mineralogist, Part I, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks	----	----
**Part II, 1887, 222 pp., 36 illustrations. William Irelan, Jr.	----	----
**Seventh Annual Report of the State Mineralogist, 1887, 315 pp. William Irelan, Jr.	----	----
**Eighth Annual Report of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr.	----	----
**Ninth Annual Report of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr.	----	----
**Tenth Annual Report of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr.	----	----
Eleventh Report (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Irelan, Jr.	$1.00	$0.20
**Twelfth Report (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford	----	----
**Thirteenth Report (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford	----	----
Chapters of the State Mineralogist's Report, Biennial Period, 1913–1914, Fletcher Hamilton:		
**Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper	----	----
Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper	.50	.10
**Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper	----	----
**Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper	----	----
**Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper	----	----
**Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper	----	----
**Fourteenth Report of the State Mineralogist, for the Biennial Period 1913–1914, Fletcher Hamilton, 1915: A General Report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth	----	----
Chapters of the State Mineralogist's Report, Biennial Period, 1915–1916. Fletcher Hamilton:		
**Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper	----	----
Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper	.50	.05
**Mines and Mineral Resources, El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper	----	----
Mines and Mineral Resources, Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper	.65	.10
**Mines and Mineral Resources, Los Angeles, Orange and Riverside Counties, 136 pp., paper	----	----
**Mines and Mineral Resources, San Bernardino and Tulare Counties, 186 pp., paper	----	----

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	Price	Shipping Charges
**Fifteenth Report of the State Mineralogist, for the Biennial Period 1915–1916, Fletcher Hamilton, 1917: A General Report on the Mines and Mineral Resources of Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare Counties, 990 pp., 413 illustrations, cloth	----	----
Chapters of the State Mineralogist's Report, Biennial Period, 1917–1918, Fletcher Hamilton:		
**Mines and Mineral Resources of Nevada County, 270 pp., paper	----	----
Mines and Mineral Resources of Plumas County, 188 pp., paper	$0.50	$0.10
Mines and Mineral Resources of Sierra County, 144 pp., paper	.50	.10
Seventeenth Report of the State Mineralogist, 1920, 'Mining in California during 1920,' Fletcher Hamilton; 562 pp., 71 illustrations, cloth	1.75	.25
Eighteenth Report of the State Mineralogist, 1922, 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:		
**January, **February, **March, **April, **May, **June, July, August, September, October, **November, December, 1922	.25	.05
Chapters of Nineteenth Report of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923	.25	.05
Chapters of Twentieth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, **July, October, 1924, per copy	.25	.05
Chapters of Twenty-first Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:		
January, 1925, Mines and Mineral Resources of Sacramento, Monterey and Orange Counties	.25	.05
April, 1925, Mines and Mineral Resources of Calaveras, Merced, San Joaquin, Stanislaus and Ventura Counties	.25	.05
July, 1925, Mines and Mineral Resources of Del Norte, Humboldt and San Diego Counties	.25	.10
**October, 1925, Mines and Mineral Resources of Siskiyou, San Luis Obispo and Santa Barbara Counties	----	----
Chapters of Twenty-second Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:		
**January, 1926, Mines and Mineral Resources of Trinity and Santa Cruz Counties	----	----
April, 1926, Mines and Mineral Resources of Shasta, San Benito and Imperial Counties	.25	.10
July, 1926, Mines and Mineral Resources of Marin and Sonoma Counties	.25	.05
**October, 1926, Mines and Mineral Resources of El Dorado and Inyo Counties, also report on Minaret District, Madera County	----	----
Chapters of Twenty-third Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:		
January, 1927, Mines and Mineral Resources of Contra Costa County; Santa Catalina Island	.25	.10
April, 1927, Mines and Mineral Resources of Amador and Solano Counties	.25	.05
July, 1927, Mines and Mineral Resources of Placer and Los Angeles Counties	.25	.10
October, 1927, Mines and Mineral Resources of Mono County	.25	.05
Chapters of Twenty-fourth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:		
January, 1928, Mines and Mineral Resources of Tuolumne County	.25	.05
April, 1928, Mines and Mineral Resources of Mariposa County	.25	.05
July, 1928, Mines and Mineral Resources of Butte and Tehama Counties	.25	.05
October, 1928, Mines and Mineral Resources of Plumas and Madera Counties	.25	.05
Chapters of Twenty-fifth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:		
**January, 1929, Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines	----	----

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April, 1929, Mines and Mineral Resources of Sierra, Napa, San Francisco and San Mateo Counties	$0.25	$0.10
July, 1929, Mines and Mineral Resources of Colusa, Fresno and Lake Counties	.25	.10
October, 1929, Mines and Mineral Resources of Glenn, Alameda, Mendocino and Riverside Counties	.25	.10
Chapters of Twenty-sixth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:		
January, 1930, Mines and Mineral Resources of Santa Clara County; also Barite in California	.25	.05
April, 1930, Mines and Mineral Resources of Nevada County; also Mineral Paint Materials in California	.25	.05
July, 1930, Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California	.25	.10
October, 1930, Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary)	.25	.10
Chapters of Twenty-seventh Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:		
January, 1931, Preliminary Report on Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline Talc. Decorative Effects in Concrete	.25	.10
April, 1931, Stratigraphy of the Kreyenhagen Shale. Diatoms and Silicoflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyenhagen Shale. Geology of Santa Cruz Island	.25	.10
July, 1931. (Yuba, San Bernardino.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining	.25	.10
October, 1931. (Alpine.) Geology of the San Jacinto Quadrangle south of San Gorgonio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931	.25	.05
Chapters of Twenty-eighth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:		
January, 1932, Economic Mineral Deposits of the San Jacinto Quadrangle. Geology and Physical Properties of Building Stone from Carmel Valley. Contributions to the Study of Sediments. Sediments of Monterey Bay. Sanbornite	.25	.10
**April, 1932. Elementary Placer Mining Methods and Gold Saving Devices. The Pan, Rocker and Sluice Box. Prospecting for Vein Deposits. Bibliography of Placer Mining	----	----
Abstract from April quarterly: Elementary Placer Mining Methods and Gold Saving Devices. Types of Deposits. Simple Equipment. Special Machines. Dry Washing. Black Sand Treatment. Marketing of Products. Placer Mining Areas. Laws. Prospecting for Quartz Veins. Bibliography (mimeographed)	.20	.05
July-October. (Ventura.) Report accompanying Geologic Map of Northern Sierra Nevada. Fossil Plants in Auriferous Gravels of the Sierra Nevada. Glacial and Associated Stream Deposits of the Sierra Nevada. Jurassic and Cretaceous Divisions in the Knoxville-Shasta Succession of California. Geology of a Part of the Panamint Range. Economic Report of a Part of the Panamint Range. Acquiring Mining Claims Through Tax Title. The Biennial Report of State Mineralogist	.50	.15
Chapters of Report XXIX, 1933 (quarterly): titled "California Journal of Mines and Geology," containing the following:		
January-April. Gold Deposits of the Redding and Weaverville Quadrangles. Geologic Formations of the Redding-Weaverville District, Northern California. Geology of Portions of Del Norte and Siskiyou Counties. Applications of		

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Geology to Civil Engineering. The Lakes of California. Discovery of Piedmontite in the Sierra Nevada. Tracing 'Buried River' Channel Deposits by Geomagnetic Methods. Geologic Map of Redding-Weaverville District, showing gold mines and prospects. Geologic Map showing various mines and prospects of part of Del Norte and Siskiyou Counties--	$0.80	$0.15
July-October. Gold Resources of Kern County. Limestone Deposits of the San Francisco Region. Limestone Weathering and Plant Associations of the San Francisco Region. Booming. Death Valley National Monument, California. Placer Mining Districts, Senate Bill 480. Navigable Waters, Assembly Bill 1543	.80	.10
Chapters of Report XXX, 1934 (quarterly): titled "California Journal of Mines and Geology," containing the following:		
January. Resurrection of Early Surfaces in the Sierra Nevada. Geology and Mineral Resources of Northeastern Madera County. Geology and Mineral Deposits of Laurel and Convict Basins, Southwestern Mono County. Notes on Sampling as Applied to Gold Quartz Deposits	.40	.10
April-July. Elementary Placer Mining in California and Notes on the Milling of Gold Ores	.80	.10
October. Current Mining Developments in Northern California. Current Mining Activity in Southern California. Geology and Mineral Resources of the Julian District, San Diego County. Geology and Mineral Resources of Elizabeth Lake Quadrangle. Dry Placers of Northern Mojave Desert. Biennial Report of State Mineralogist. Assessment Work Within Withdrawn Areas	.40	.10
Subscription, $1.50 in advance (by calendar year, only).		
Chapters of State Oil and Gas Supervisor's Report:		
Summary of Operations—California Oil Fields, July, 1918, to March, 1919 (one volume)	Free	----
Summary of Operations—California Oil Fields. Published monthly, beginning April, 1919:		
**April, **May, **June, **July, **August, **September, **October, **November, **December, 1919	----	----
**January, **February, **March, **April, **May, **June, **July, **August, **September, **October, **November, **December, 1920	----	----
January, **February, **March, April, **May, **June, **July, August, **September, **October, **November, **December, 1921	Free	----
January, February, March, April, May, June, **July, **August, September, **October, **November, December, 1922	Free	----
January, February, **March, **April, May, **June, **July, August, September, **October, November, **December, 1923	Free	----
January, February, March, April, May, June, **July, August, September, October, November, December, 1924	Free	----
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January, February, March, April, **May, June, July, August, September, October, **November, **December, 1928	Free	----
January, February, March, April, May, June, July-August-September, October-November-December, 1929 (Published quarterly beginning July, 1929.)	Free	----
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BULLETINS

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**Bulletin No. 1. A Description of Some Desiccated Human Remains, by Winslow Anderson. 1888, 41 pp., 6 illustrations	----	----
**Bulletin No. 2. Methods of Mine Timbering, by W. H. Storms. 1894, 58 pp., 75 illustrations	----	----
**Bulletin No. 3. Gas and Petroleum Yielding Formations of Central Valley of California, by W. L. Watts. 1894, 100 pp., 13 illustrations, 4 maps	----	----
**Bulletin No. 4. Catalogue of Californian Fossils, by J. G. Cooper, 1894, 73 pp., 67 illustrations. (Part I was published in the Seventh Annual Report of the State Mineralogist, 1887)	----	----
**Bulletin No. 5. The Cyanide Process, 1894, by Dr. A. Scheidel. 140 pp., 46 illustrations	----	----
**Bulletin No. 6. California Gold Mill Practices, 1895, by E. B. Preston, 85 pp., 46 illustrations	----	----
**Bulletin No. 7. Mineral Production of California, by Counties, for the year 1894, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 8. Mineral Production of California, by Counties, for the year 1895, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 9. Mine Drainage, Pumps, etc., by Hans C. Behr. 1896, 210 pp., 206 illustrations	----	----
**Bulletin No. 10. A bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by Anthony W. Vogdes. 1896, 121 pp.	----	----
**Bulletin No. 11. Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties, by W. L. Watts. 1897, 94 pp., 6 maps, 31 illustrations	----	----
**Bulletin No. 12. Mineral Production of California, by Counties, for 1896, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 13. Mineral Production of California, by Counties, for 1897, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 14. Mineral Production of California, by Counties, for 1898, by Charles G. Yale	----	----
**Bulletin No. 15. Map of Oil City Fields, Fresno County, by John H. Means, 1899	----	----
**Bulletin No. 16. The Genesis of Petroleum and Asphaltum in California, by A. S. Cooper. 1899, 39 pp., 29 illustrations	----	----
**Bulletin No. 17. Mineral Production of California, by Counties, for 1899, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 18. Mother Lode Region of California, by W. H. Storms. 1900, 154 pp., 49 illustrations	----	----
**Bulletin No. 19. Oil and Gas Yielding Formations of California, by W. L. Watts. 1900, 236 pp., 60 illustrations, 8 maps	----	----
**Bulletin No. 20. Synopsis of General Report of State Mining Bureau, by W. L. Watts. 1901, 21 pp. This bulletin contains a brief statement of the progress of the mineral industry in California for the four years ending December, 1899	----	----
**Bulletin No. 21. Mineral Production of California by Counties, by Charles G. Yale. 1900. Tabulated sheet	----	----
**Bulletin No. 22. Mineral Production of California for Fourteen Years, by Charles G. Yale. 1900. Tabulated sheet	----	----
**Bulletin No. 23. The Copper Resources of California, by P. C. DuBois, F. M. Anderson, J. H. Tibbits and G. A. Tweedy. 1902, 282 pp., 69 illustrations, 9 maps	----	----
**Bulletin No. 24. The Saline Deposits of California, by G. E. Bailey. 1902, 216 pp., 99 illustrations, 5 maps	----	----
**Bulletin No. 25. Mineral Production of California, by Counties, for 1901, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 26. Mineral Production of California for the Past Fifteen Years, by Charles G. Yale. 1902. Tabulated sheet	----	----

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**Bulletin No. 28. Mineral Production of California for 1902, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 29. Mineral Production of California for Sixteen Years, by Charles G. Yale. 1903. Tabulated sheet	----	----
**Bulletin No. 30. Bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by A. W. Vogdes. 1903, 290 pp.	----	----
**Bulletin No. 31. Chemical Analyses of California Petroleum, by H. N. Cooper. 1904. Tabulated sheet	----	----
**Bulletin No. 32. Production and Use of Petroleum in California, by Paul W. Prutzman. 1904, 230 pp., 116 illustrations, 14 maps	----	----
**Bulletin No. 33. Mineral Production of California, by Counties, for 1903, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 34. Mineral Production of California for Seventeen Years, by Charles G. Yale. 1904. Tabulated sheet	----	----
**Bulletin No. 35. Mines and Minerals of California, by Charles G. Yale. 1904, 55 pp., 20 county maps. Relief map of California	----	----
**Bulletin No. 36. Gold Dredging in California, by J. E. Doolittle. 1905. 120 pp., 66 illustrations, 3 maps	----	----
**Bulletin No. 37. Gems, Jewelers' Materials, and Ornamental Stones of California, by George F. Kunz. 1905, 168 pp., 54 illustrations	----	----
**Bulletin No. 38. Structural and Industrial Materials of California, by Wm. Forstner, T. C. Hopkins, C. Naramore and L. H. Eddy. 1906, 412 pp., 150 illustrations, 1 map	----	----
**Bulletin No. 39. Mineral Production of California, by Counties, for 1904, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 40. Mineral Production of California for Eighteen Years, by Charles G. Yale. 1905. Tabulated sheet	----	----
**Bulletin No. 41. Mines and Minerals of California for 1904, by Charles G. Yale. 1905, 54 pp., 20 county maps	----	----
**Bulletin No. 42. Mineral Production of California, by Counties, 1905, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 43. Mineral Production of California for Nineteen Years, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 44. California Mines and Minerals for 1905, by Charles G. Yale. 1907, 31 pp., 20 county maps	----	----
**Bulletin No. 45. Auriferous Black Sands of California, by J. A. Edman. 1907. 10 pp.	----	----
**Bulletin No. 46. General Index of Publications of the California State Mining Bureau, by Charles G. Yale. 1907, 54 pp.	----	----
**Bulletin No. 47. Mineral Production of California, by Counties, 1906, by Charles G. Yale. Tabulated sheet	----	----
**Bulletin No. 48. Mineral Production of California for Twenty Years, by Charles G. Yale. 1906	----	----
**Bulletin No. 49. Mines and Minerals of California for 1906, by Charles G. Yale. 34 pp.	----	----
Bulletin No. 50. The Copper Resources of California, 1908, by A. Hausmann, J. Kruttschnitt, Jr., W. E. Thorne and J. A. Edman. 366 pp., 74 illustrations. (Revised edition)	$1.00	$0.25
**Bulletin No. 51. Mineral Production of California, by Counties, 1907, by D. H. Walker. Tabulated sheet	----	----
**Bulletin No. 52. Mineral Production of California for Twenty-one Years, by D. H. Walker. 1907. Tabulated sheet	----	----
**Bulletin No. 53. Mineral Production of California for 1907, with County Maps, by D. H. Walker. 62 pp.	----	----

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**Bulletin No. 54. Mineral Production of California, by Counties, by D. H. Walker, 1908. Tabulated sheet	----	----
**Bulletin No. 55. Mineral Production of California for Twenty-two Years, by D. H. Walker, 1908. Tabulated sheet	----	----
**Bulletin No. 56. Mineral Production for 1908, with County Maps and Mining Laws of California, by D. H. Walker, 78 pp.	----	----
**Bulletin No. 57. Gold Dredging in California, by W. B. Winston and Chas. Janin. 1910, 312 pp., 239 illustrations, 10 maps	----	----
**Bulletin No. 58. Mineral Production of California, by Counties, by D. H. Walker. 1909. Tabulated sheet	----	----
**Bulletin No. 59. Mineral Production of California for Twenty-three Years, by D. H. Walker. 1909. Tabulated sheet	----	----
**Bulletin No. 60. Mineral Production for 1909, with County Maps and Mining Laws of California, by D. H. Walker. 94 pp.	----	----
**Bulletin No. 61. Mineral Production of California, by Counties, for 1910, by D. H. Walker. Tabulated sheet	----	----
**Bulletin No. 62. Mineral Production of California for Twenty-four Years, by D. H. Walker. 1910. Tabulated sheet	----	----
**Bulletin No. 63. Petroleum in Southern California, by P. W. Prutzman. 1912, 430 pp., 41 illustrations, 6 maps	----	----
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**Catalogue of the State Museum of California, Volume II, being the collection made by the State Mining Bureau from April 16, 1881, to May 5, 1884. 220 pp.	----	----
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MAPS

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**Register of Mines, with Map, Nevada County	----	----
**Register of Mines, with Map, Placer County	----	----
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**Register of Mines, with Map, Siskiyou County	----	----
**Register of Mines, with Map, Trinity County	----	----
**Register of Mines, with Map, Tuolumne County	----	----
Register of Mines, with Map, Yuba County (1905)	.25	.05
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OTHER MAPS

**Map of California, Showing Mineral Deposits (50 x 60 in.)	----	----
**Map of Forest Reserves in California	----	----
**Mineral and Relief Map of California	----	----
**Map of El Dorado County, Showing Boundaries, National Forests	----	----
**Map of Madera County, Showing Boundaries, National Forests	----	----
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**Map of Mother Lode Region	----	----
**Map of Desert Region of Southern California	----	----
Map of Minaret District, Madera County	.20	.05
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**Map of Calaveras County	----	----
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Geological Map of Inyo County. Scale 1 inch equals 4 miles	.60	.05
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Geological Map of California, 1916. Scale 1 inch equals 12 miles. As accurate and up-to-date as available data will permit as regards topography and geography. Shows railroads, highways, post offices and other towns. First geological map that has been available since 1892, and shows geology of entire state as no other map does. Geological details lithographed in 23 colors. Unmounted	.75	.05
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Map of Mariposa County showing principal gold mines	.10	----

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OIL FIELD MAPS

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Map No. 20—Long Beach, Los Angeles County	1.50
Map No. 21—Portion of District No. 4, showing boundaries of oil fields—Kern and Kings Counties	.75
Map No. 21-A—Portion of District No. 4, showing boundaries of oil fields—Kern County	.75
Map No. 21-B—Portion of District No. 5, showing boundaries of oil fields—Fresno, Kings and Kern Counties	.75
Map No. 22—Portion of District No. 3, showing boundaries of oil fields—Santa Barbara County	.75
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DETERMINATION OF MINERAL SAMPLES

Samples (limited to one at one time) of any mineral found in the State may be sent to the Division of Mines for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the State. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

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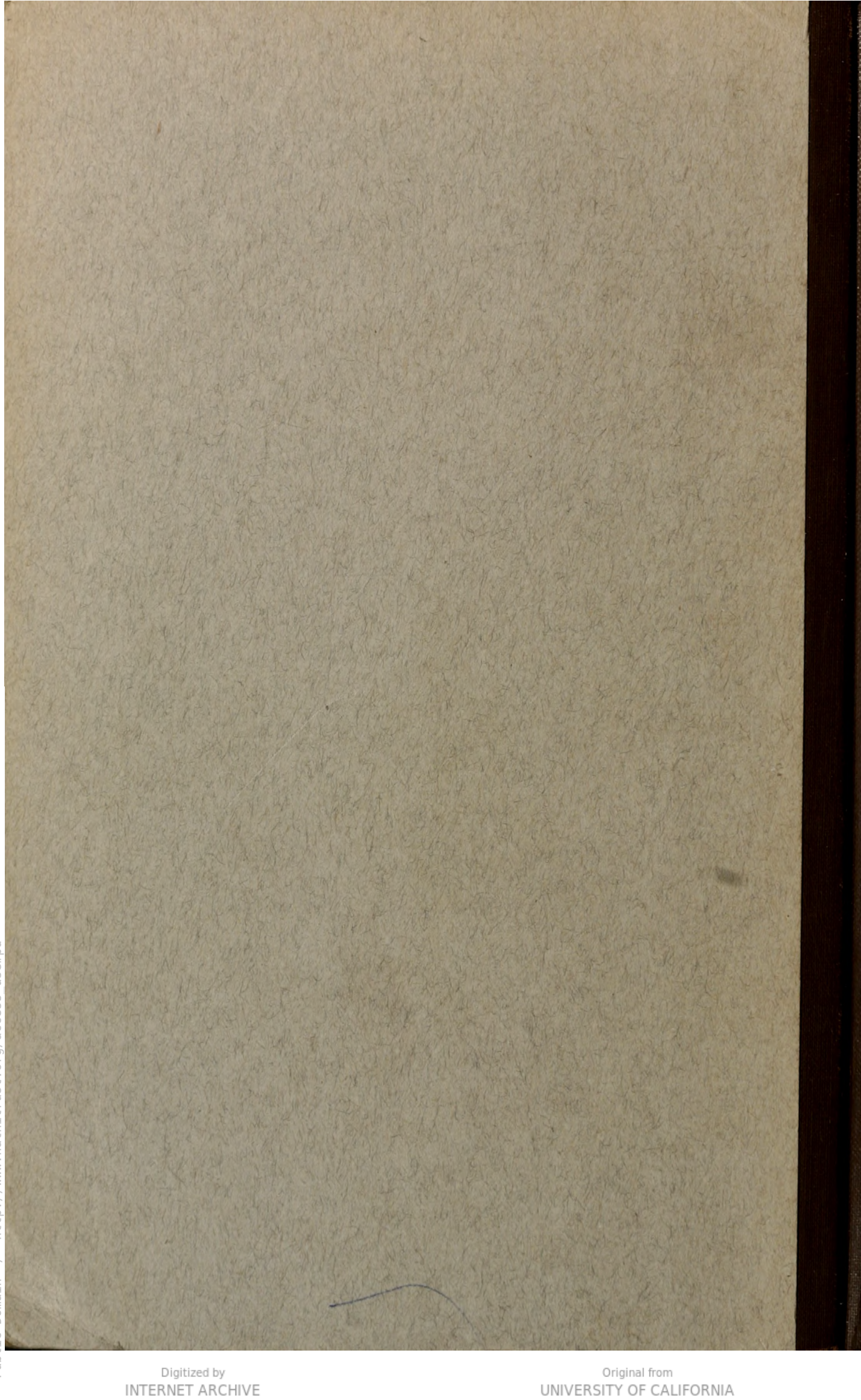

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